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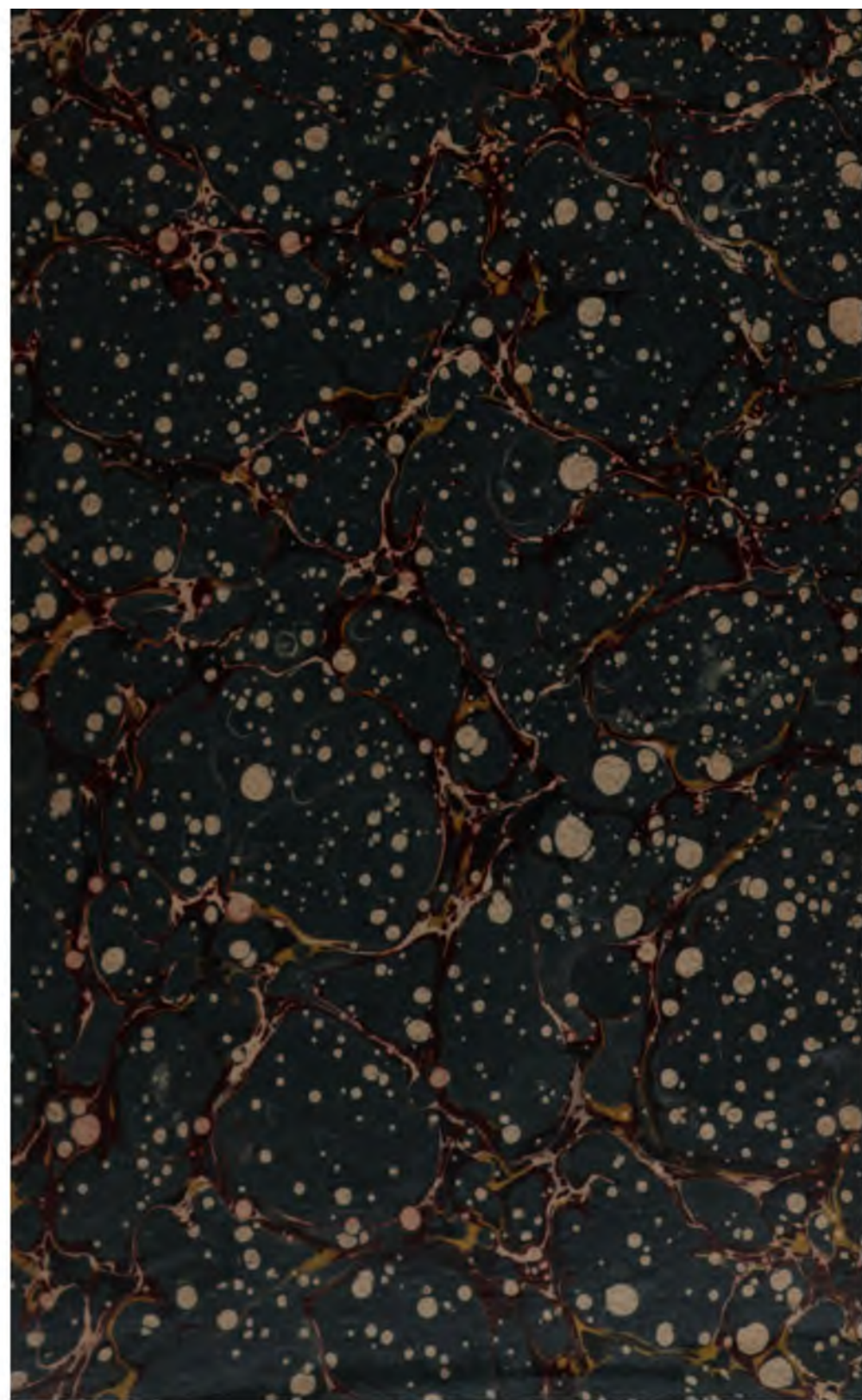
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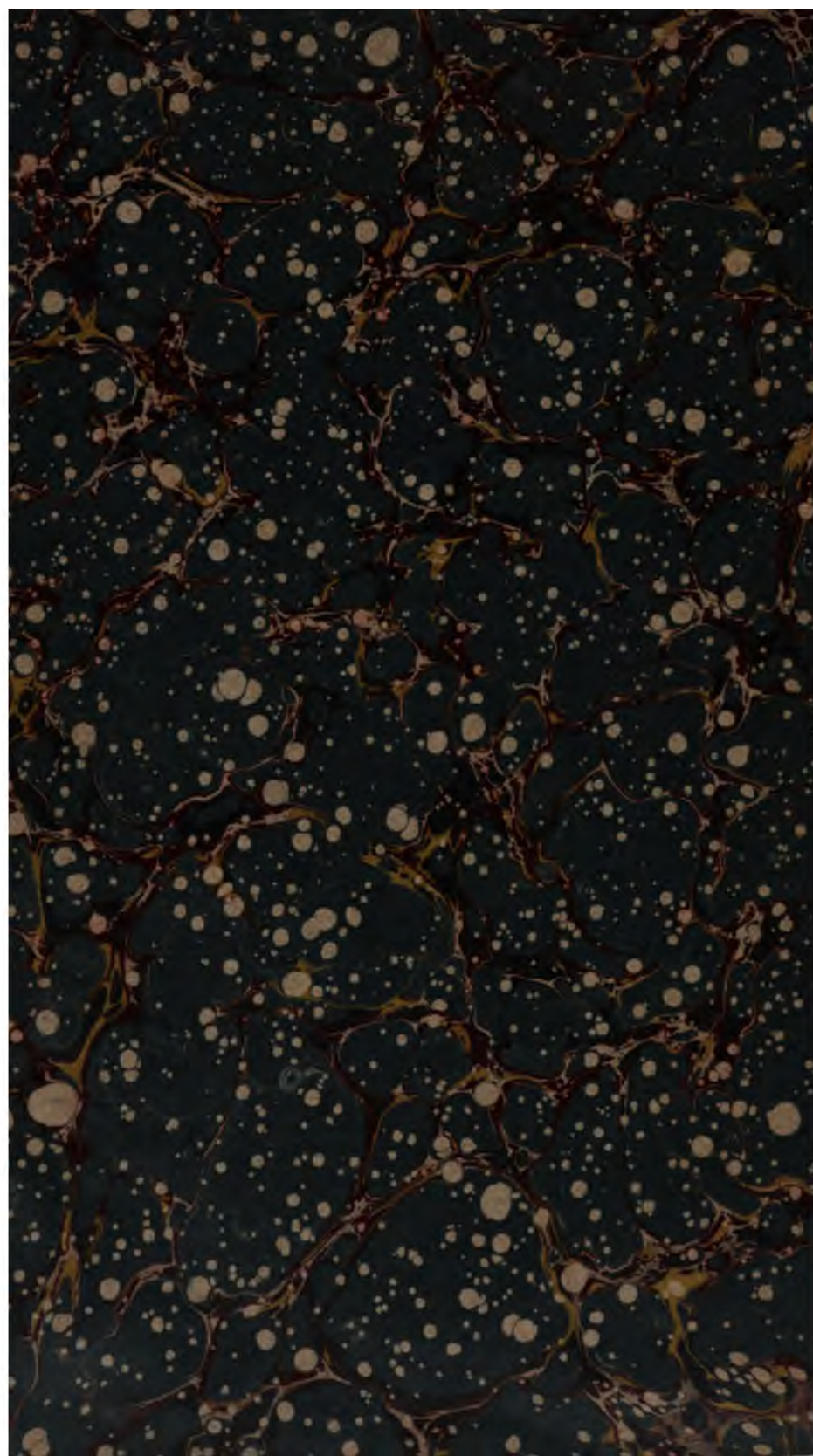
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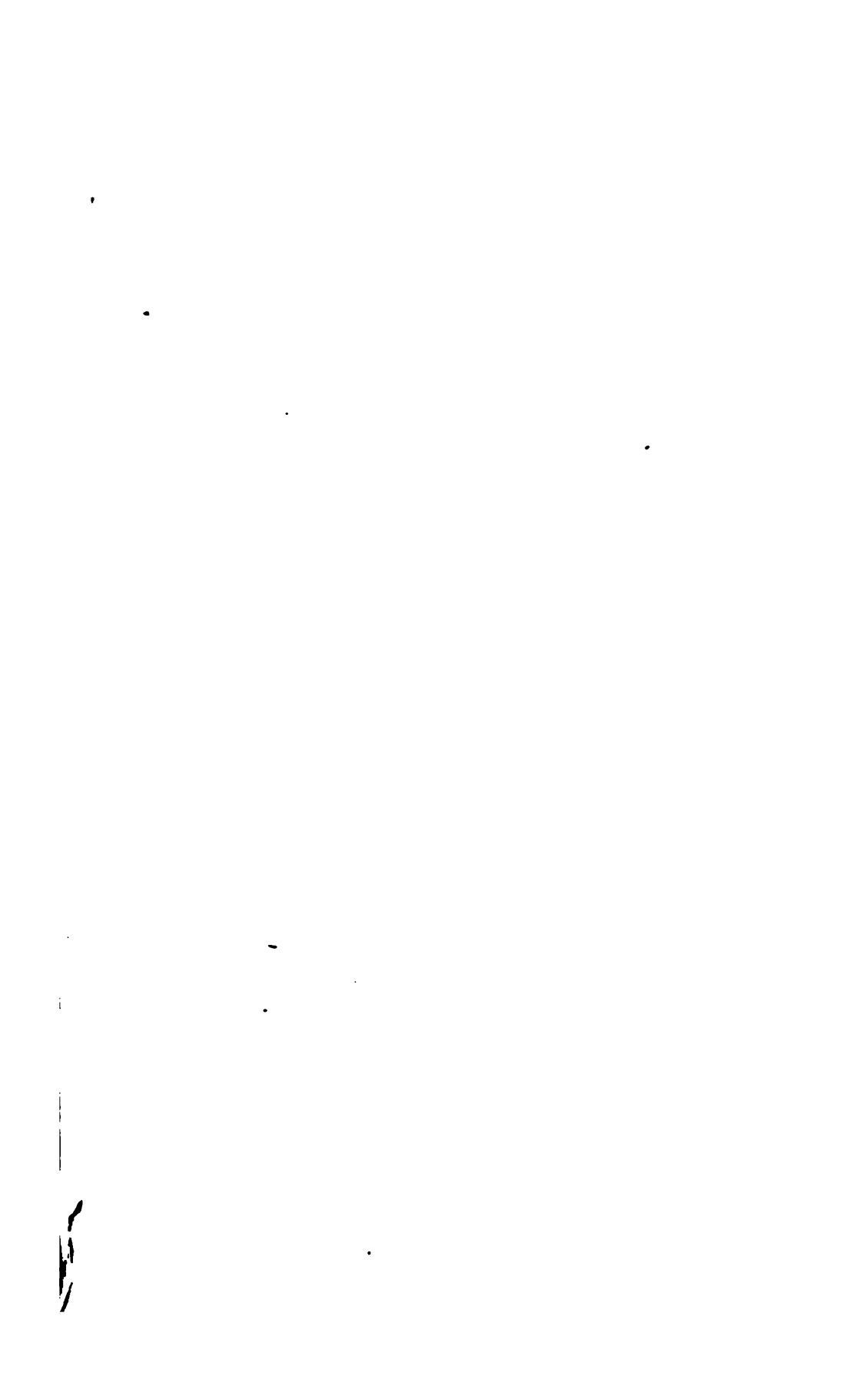
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PROCEEDINGS
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PETROGRAPHICAL NOTES FROM BAJA CALIFORNIA, MEXICO.

BY W. LINDGREN, U. S. GEOL. SURVEY.

During a short visit, in January, 1888, to the northern part of the peninsula of Baja or Lower California, a small collection was made of the rocks occurring near Ensenada de Todos Santos, and along the section from there to the Colorado Desert. A description of the general geology along this route has been published in the Proceedings of the Academy.* The rocks collected have recently been subjected to a more careful investigation; the results of which are contained in these notes. A few facts regarding the geological structure of the region are here necessarily repeated, while for detailed accounts, maps, profiles, etc., the reader is referred to the paper just mentioned.

The rocks described may be grouped in five divisions:

- I. Granite and diorite.
- II. Paleovolcanic effusive rocks (quartz porphyrites).
- III. Neovolcanic effusive rocks (basalt).
- IV. The slate series.
- V. Diabases.

* Proc. Cal. Acad. Sci., 2nd Ser., Vol. I, Part 2, 1888.

I.—GRANITE AND DIORITE.

It has been shown in the paper referred to that the structure of the peninsula at the latitude of Euseñada is that of a monoclinical mountain range with a gentle slope towards the Pacific and an abrupt faultscarp, facing the Colorado Desert. Furthermore, that the range is chiefly made up of a coarse-granular granitic rock, in which are intercalated several smaller areas of more or less altered slates, dipping towards the east at a high angle. Volcanic flows of different age are spread over the long western slope, and are especially accumulated in heavy masses near the Pacific. Again, at the foot of the faultscarp, near the western limit of the Colorado Desert, effusive rocks occur, the age of which probably is pliocene, or recent.

In the paper quoted, the granitic rock has several times been described as a hornblende granite (Rosenbusch), being a coarse granular mixture of biotite, hornblende, feldspar and quartz. From the examination in the field and the great resemblance to the granitic masses of Southern and Central California, there seemed to be but little doubt that this would be the correct classification.

The detailed petrographical examination of specimens from very different localities along the section has shown, however, that the predominant feldspar usually is a plagioclase, and that the orthoclase only occurs in comparatively small quantities, or may even be entirely absent.

While the quantity of hornblende and biotite may vary within certain limits, the general habit and appearance of the granitic rock is remarkably constant from Euseñada to the desert. It is rather coarse-grained and easily disintegrating, giving to the bluffs the well known "woolsack-structure." When decomposing, it often assumes a yellowish color, due no doubt to the large proportion of ferromagnesian silicates which it contains.

Detailed Description.

1. A specimen from Ensenada, corner of Galvez and Tenth street, is macroscopically a coarse-grained rock with fresh feldspar and quartz. Hornblende is present in much larger quantity than biotite, and on the whole there are more ferromagnesian silicates than usually.

Under the microscope it is seen to consist of a hyphidiomorphic granular mixture of quartz, plagioclase, hornblende, monoclinic and rhombic pyroxene and biotite. The monoclinic pyroxene forms ill-defined, short and colorless prisms, considerably decomposed and obscured by chloritic and uraltic aggregates. More frequent than the monoclinic pyroxene, is a rhombic form of the same mineral, probably hypersthene, occurring in irregular grains or short prisms; the pleochroismus is distinct ranging from reddish to light green; it is frequently decomposed in the same way as the monoclinic pyroxene. The primary hornblende is of a brownish green color, has the usual absorption and pleochroismus, and is often intimately connected with the pyroxene, being grown together with it or even surrounding it.

Besides this normal hornblende, there is some uraltite formed from the pyroxene and distinguished from the first mentioned mineral by its bluish green color. A yellowish brown biotite in foils, which show no bending or compression, is also an important constituent of the rock. Magnetite, much apatite and zircon occur. Among the feldspars the plagioclase certainly predominates. There is probably some orthoclase, although this cannot be definitely stated.

The plagioclase is more or less idiomorphic, with generally short lathlike or square forms. Often twinned according to both the albite and the pericline law; zonar structure with correspondingly differing extinction is not unfrequent. This plagioclase is probably an andesine or an oligoclase.

Between the plagioclase crystals, and closely following their outlines, lie numerous grains of clear quartz with comparatively few fluid inclusions.

The rock, according to this description, should be classified as a pyroxenic facies of quartz-mica diorite.

2. Another specimen, also from Ensenada (corner Galvez and Fourteenth streets), is macroscopically a fresh, not very coarse grained mixture of hornblende, biotite, feldspar and quartz. Under the microscope foils of brown mica and irregular grains of a dark green hornblende form the principal part of the ferromagnesian silicates; there are also, however, a few prismatic grains of a colorless augite (malacolite). Plagioclase is present in large quantities with the usual, partly idiomorphic prismatic forms, and between them lie numerous quartz grains with fluid inclusions.

The rock should, hence, be characterized as a *quartz-mica diorite*.

3. A specimen of beautiful and fresh granitic rock was collected near the middle line of the peninsular range, at the east side of San Rafael Valley, on the road from Real to Campo Nacional, near mouth of Cañada del Sur.

Very fresh, coarse granular rock with hornblende crystals up to 10 mm. long, biotite foils, white, often striated crystals of plagioclase up to 8 mm. long and much quartz.

Under the microscope, zircon and apatite, in small quantities, a little magnetite mostly associated with hornblende. Biotite in straight, fresh foils, yellowish-brown, and with very strong absorption, forms inclusions in feldspar and hornblende. Dark green hornblende also with very strong absorption: a, olive green; b and c, dark green; absorption of b nearly equal to that of c; one or two large, approximately square grains of uralitized pyroxene, probably diallage or augite. The plagioclase of which a large quantity is present is as usual partly idiomorphic, and in all respects

agrees with that in the specimens already described. It contains many small biotite needles. Orthoclase is perhaps present in very small quantity. Quartz is abundant, filling the interstices between the feldspar grains, and containing very numerous fluid inclusions, with moving bubbles.

There are no signs of mechanical deformation among the constituents. Hardly any of the quartz grain show undulous extinction.

In order to determine more accurately the character of the feldspars, a separation by specific gravity was made by means of the Thoulet solution.

A quantity of 4 grms. was used, and reduced to 0.4 mm. grain. The result was as follows:

Beginning with the solution at the specific gravity of 2.75 hornblende and biotite fell; between 2.75 and 2.66 no appreciable amount was precipitated, while at about 2.655 a large quantity of feldspar, mixed with a little quartz fell. The largest proportion of quartz fell somewhat below this specific gravity. Only a few grains remained swimming with the solution at 2.60–2.59.

The complete separation of feldspar and quartz was found to be somewhat difficult, their specific gravities being so nearly equal. The percentage of the different constituents would approximately be as follows:

25% hornblende and biotite.
40% plagioclase.
35% quartz.

The feldspar being so thoroughly fresh, it is safe to conclude from the specific gravity that it is an oligoclase, perhaps somewhat approaching the andesine. The rock is thus characterized as a *quartz-mica diorite*.

4. A fourth typical specimen, collected near the summit of the main range at Hansen's Ranch is a coarse granitic

rock with more biotite and less hornblende than the preceding. Fairly but not quite fresh.

A separation of this rock by Thoulet's solution gave the following result, size of grain and quantity being the same as before:

18 % biotite and hornblende; 66 % fell at 2.64-66, consisting of quartz and plagioclase, sp. gr. of the latter being nearly equal that of quartz. This portion was not further separated. 16 % fell at 2.55-57, consisting of orthoclase. This portion was tested with silico-hydrofluoric acid and gave abundant Ka, no Na reaction. The numbers of percentage are of course only approximate. Here, then, orthoclase is present, but not in very large quantity; there is certainly a very large excess of plagioclase, and this rock should also be classified as a *quartz-mica diorite*.

5. A specimen, taken from the foot of the supposed fault-scarp, about one-third mile west of Real del Castillo (San Rafael Valley) and near a slate contact, differs considerably from those already described. It is a rather fine-grained, granitic rock of whitish color and containing a few biotite foils. Under the microscope it is seen to consist of some partly idiomorphic plagioclase crystals, a few greenish-brown biotite foils, very little muscovite and a predominating allotriomorphic mass of orthoclase and quartz, oftener showing a tendency to granophyric structure. The feldspars contain, in consequence of an incipient decomposition, a considerable amount of muscovite. The specimen may be characterized as a *granite*.

The chief interest, however, centers in the marked mechanical effects of pressure which this section shows. Among the quartz grains undulous extinction is quite common, and many of them are even broken and shattered. The feldspar grains show still more markedly undulous and irregular extinction and also frequently peripheric crushing (*Randliche Kataklaste*). Thus, the internal structure of the

rock indicates that it at one time has been subjected to intense pressure; a conclusion interesting in view of the occurrence of the specimen at the foot of the supposed faultscarp and in close vicinity to the slate contact.

The detailed description of the rocks from various localities in the granitic range, seems to indicate that the largest part of it is composed of a quartz-mica diorite, containing a varying but small percentage of orthoclase. Nos. 1 and 5 both differ from the normal type, the former being more basic, approaching the augite diorites, or even the norites by its percentage of monoclinic and rhombic pyroxene, the latter more acid and a nearly normal granite.

It is well known that large masses of coarse granular rock, though they, geologically, may be a unit, do not always remain constant in structure and mineralogical composition. Irregular and ill-defined areas of more or less basic character are often included in the predominant rock, and frequently connected with it by means of transitions.

Thus, although the main mass of the Peninsular Sierra along this section may be, and probably is, made up of quartz-mica diorite, still it does not necessarily follow that this character should be retained beyond this line.

Southward the great massive continues down the peninsula for at least two hundred or three hundred miles, where at last it disappears under the mesa sandstones.

Northward it continues through San Diego and Los Angeles counties, and forms the larger part of the Sierra Nevada until, in the northern part of that range, the auriferous slates gradually encroach upon it.

The rock of this vast area has by previous writers always been referred to as a granite or a hornblende biotite granite. Not unlikely this is petrographically correct, for at least a large part of it, and smaller areas where locally a plagi-

elastic feldspar prevails—as would be the case along the profile from Baja California, described in these notes—would then be indicated as a dioritic facies of granite.

We have, however, as yet, very few reliable petrographical determinations in this area, but the few available seem rather to indicate that a large portion of it consists of rocks in which plagioclase prevails.* Future examinations will show the extent of these dioritic areas and their connection with the granite.

II.—PALÆOVOLCANIC EFFUSIVE ROCKS.

Quartz-porphyrites.

Heavy masses of effusive rocks cover the granite almost everywhere in the country adjoining Todos Santos Bay. Sometimes these eruptives form massive, high ranges, like that extending from Punta Banda to Santo Tomas, deeply cut into by erosion; or, again, like the hills near San Carlos and north of Ensenada, perfectly distinct flows or sheets may be observed, nearly horizontal at the coast but inclining at a steeper angle further inland. Considerably altered tufaceous masses sometimes appear in connection with them. Nearly all of these rocks have a porphyritic habit and are very acid, while the feldspars are predominantly plagioclastic. On the whole, they may be characterized as quartz-porphyrites and quartz-hornblende porphyrites, although the latter are comparatively less extensively developed. Fragments and boulders of these porphyrites are included

* Ad. Schmidt (L. J., 1878 716) examined a specimen from the Yosemite Valley and found it to be a quartz diorite. He also pointed out the great general similarity of this quartz diorite (identical with the quartz-mica diorite described in this paper) with the Tonalite (v. Rath), occurring as an intrusive massive in Southern Tyrol at Mt. Adamello.

An analysis of the Yosemite granite in King's Fortieth Parallel (Systematic Geology, p. 111), shows 4.49 per cent. Na_2O , and only 2.08 per cent. K_2O , thus confirming Schmidt's results.

A granite from Steamboat Springs, Nevada, near the east base of the Sierra Nevada, carries apparently about equal quantities of orthoclase and plagioclase. (G. F. Becker, Quicksilver Deposits of the Pacific Coast, Monograph XIII, U. S. Geol. Survey.

in the cretaceous sandstones and conglomerates of Punta Banda, which would indicate a mesozoic or pre-mesozoic age of these eruptions. In view of the fact, however, that the flow structure is still clearly discernible and well preserved, and that tufas are of frequent occurrence, we are justified in regarding the age of the flows as mesozoic, even perhaps, late mesozoic. The center from which these flows originated was probably situated twenty or twenty-five miles inland; at any rate the porphyrites do not continue in an easterly direction any further than this.

Various structural varieties may be noted among these rocks, as well as differences in the macroscopical appearance. As a rule the quartz-porphyrites have a very hard, dense and flinty groundmass of black or brown color, in which lie embedded quartz grains and small tabular feldspar crystals.

Detailed Description.

1. The rocks from Punta Ensenada, the bluff just northwest of the town of that name, correspond in macroscopical appearance well with the description just given. The groundmass is chocolate-brown, and contains many small, white feldspar crystals, not exceeding 0.5 mm. in length. No porphyritic quartz. Under the microscope the feldspars appear in prismatic sections, all of which show polysynthetic twin-structure. Isolated fragments gave with hydro-silico-fluoric acid abundant Na reaction, and but very little Ca; according to this the feldspar would probably be an oligoclase. No bisilicate or porphyritic quartz. The groundmass is holocrystalline, composed of a fine aggregate of quartz and feldspar; it often has a microfluidal appearance by the arrangement of the opacite in streaks and bands.

Sometimes there are curved streaks of a clearer mass, which, between crossed nicols, shows perpendicular, double-refracting fibres, evidently consisting of feldspar. The feldspar grains of the groundmass are not striated. In spite of

the absence of porphyritic quartz, this rock contains 74.25% SiO_2 .

2. A type similar to this, but with much porphyritic quartz, was collected in the hills east of San Carlos. Macroscopically it has a violet-brown groundmass, with numerous small quartz grains and feldspar tables. In thin section, some of the feldspar crystals show no twin structure, but are otherwise similar to those in the type just described. Numerous isolated fragments showed, however, when tested with hydrosilico-fluoric acid, that a plagioclase, nearly related to oligoclase, predominated.

Quartz occurs porphyritic in a few larger rounded and corroded grains with numerous fluid inclusions, some of which show moving bubbles. The groundmass consists of allotriomorphic quartz and unstriated feldspar grains, between which lies a still finer holocrystalline quartz-feldspar mass. No glass or microfelsite. In the groundmass lie numerous clearer bent and curved streaks, consisting of fine fibres arranged perpendicularly to the length extension of the bodies; the fibres which are not very strongly doubly refracting often join in the middle along a seam parallel to the length extension. These peculiar forms, calling to mind the *axiolites* of the rhyolites (Zirkel), would here, however, appear to consist of feldspar. Fine Fe_2O_3 and opacite are distributed throughout the groundmass.

In the foothills of Sausal Valley similar rocks are found, in which, however, the groundmass is coarser, microcrystalline, and consisting of interlaced quartz and feldspar grains, with a slight approximation to granophyric structure. Some of the feldspar grains in the groundmass are striated.

The porphyrites from the Punta Banda Range differ partly from those already described. The largest proportion of them appear to be quartz-hornblende porphyrites, but be-

sides these there are other dioritic and granitic rocks, the exact relation of which to the others could not be clearly established. In the types described above, hornblende is either absent, or else only appears as indefinite remains of magmatic resorption.

3. Specimens taken near the Pacific, on the south side of Punta Banda, opposite the proposed hotel, show a grayish-brown groundmass, with a few small feldspar and hornblende prisms. Under the microscope the feldspars are seen to be plagioclastic, presumably oligoclase; the hornblende crystals are decomposed to chloritic aggregates. The groundmass is a microcrystalline feldspar-quartz aggregate, which has a microfluidal structure, indicated by alternating lighter and darker bands, and caused by the unequal distribution of opacite; the grain of the groundmass also varies between certain limits in the different bands.

4. The most common type appears to be that exhibited by the specimens from the north side of the Punta Banda Range, south of the estuary and El Maneadero. It is a greenish rock with a crystalline groundmass, in which are imbedded large white tabular feldspar crystals and small prisms of hornblende. Under the microscope the constituents of the first generation are, 1. Idiomorphic plagioclase of tabular habit. Isolated fragments give, with Boricky's test, abundant Na — less so Ca reaction, and certainly are oligoclase. 2. Smaller quartz grains, partly idiomorphic, partly rounded, filled with fluid inclusions with moving bubbles; also, gas inclusions. 3. Hornblende prisms decomposed to chlorite and bastite. 4. Magnetite. 5. Zircon.

The holocrystalline groundmass consists of relatively large grains of quartz and unstriated feldspar connected by an intimate granophyric structure.

According to Rosenbusch the rock would be designated as a *quartz-hornblende granophyre*.

Porphyrite Tufa.

Connected with these flows of quartz-porphyrite there are considerable masses of tufaceous character; sometimes, as near Hotel Iturbide at Ensenada, the tufaceous character is well preserved, although the rock is exceedingly compact, and to a great extent, filled with secondary minerals, epidote, chlorite, etc.; often, however, the tufas can only, under the microscope, be distinguished from the massive porphyrites. All of them belong to the *agglomeratic* tufas (Rosenbusch), consisting of small fragments of the primary rock cemented together by a fine detrital mass.

The tufa from near Hotel Iturbide is a dark rock with a flinty fracture and many small feldspar crystals. The elastic character is most clearly perceived on the weathered faces, which distinctly show the different fragments in relief.

Under the microscope the angular fragments consist of quartz porphyrites with holocrystalline groundmass, more or less fine, containing much opacite, and usually to be referred to the type described above under 1. Besides, there are numerous fragments of porphyritic feldspar and quartz.

All of these are cemented by a very fine microcrystalline groundmass, evidently once detrital, but in which now this character has been obscured by secondary processes. Other tufas contain, besides the fragments of porphyrites, granitic quartz and feldspar.

III.—NEOVOLCANIC EFFUSIVE ROCK.

Basalt.

The only recent or tertiary volcanic rocks examined were those from the flow, coming down from some point in the interior and ending at the steep bluffs on the coast north of Todos Santos Bay.

Specimens collected near Sausal have the macroscopic appearance of a black, fine-grained vesicular basalt; the cavities are usually covered with a yellow coating.

Under the microscope appear among the porphyritic crystals a few sharply defined plagioclasic feldspars which, as well as those of the groundmass, probably belong to the oligoclase or andesine series. Inclusion of glassy groundmass are frequent, and occasionally such of augite, also appear.

Of the bisilicates there are in porphyritic form a few, more or less well-defined pale green augite crystals, and also some more plainly idiomorphic prisms of hypersthene with its usual characteristics, the latter being the older. Olivine is conspicuously absent.

The groundmass consists of striated plagioclase micro-lites, grains and prisms of augite (the hypersthene is evidently not represented), and finally grains of magnetite, usually clinging to or included in the small augites.

Cementing these, there is an abundant light-brown globulitic glass. The round discs or balls of the globulites are of a darker coffee-brown color, and usually about 0.002 mm. in diameter; often they are included together with the glass in the porphyritic feldspars or augite. Using the terminology of Rosenbusch, we may thus characterize the rock as an olivine free hypersthene basalt, hypocrystalline-porphyritic, and with an approximation to hyalopilitic structure.

Basalts of this unusual type have already been described from several places along the Pacific Coast; from Oregon, by J. S. Diller* and A. B. Emmons,+ from Lake county, California, by G. F. Becker,‡ and from San Salvador (C. A.), by Hague and Iddings.§

The locality here described is about 500 miles south of the occurrence in Lake county (Central California, north of San Francisco).

*Am. J. Sc. XXVIII, 252.

†Bull. Calif. Acad., No. 4, 1884.

‡Geology of the Quicksilver deposit of the Pacific Coast, monograph XIII, U. S. Geol. Survey.

§Am. J. Sc. XXXII, 187, 1886.

IV.—THE SLATE SERIES.

In the vast granite area are inclosed smaller slate areas which always appear to have suffered intense lateral compression and are highly altered.

The specimens collected come from two of these areas, one in the vicinity of Real del Castillo, the other between this place and Ensenada, but petrographically speaking the rocks from both are nearly identical. The material is not sufficient for a thorough examination of the whole series, and only the general character can be indicated.

A division of the rocks may be made in—1. Chloritic slate; 2. Quartzite; 3. Carbonaceous slate.

1. *Chloritic Slate.*

Specimens of this from near Real del Castillo, are soft and decomposed; it is very likely that the chlorite is secondary and has resulted from primary pyroxenic or amphibolitic rocks.

2. *Quartzite.*

These are fine-grained, brown or grayish-brown rocks, collected near the road from Ensenada to Real, in Gallo Cañon. Some are thoroughly crystalline, consisting of sharply defined, rounded or angular quartz grains of somewhat varying size. Orthoclase is, however, also present, and even a few striated triclinic feldspars. Films of small, parallel biotite foils and grains of iron pyrites are distributed through the mass.

In other specimens the quartz and feldspar grains do not always join each other directly, but are separated by a once detrital, now microcrystalline mass of the same materials, to which is usually added minute foils of chestnut-brown biotite. The quartz grains frequently contain fluid inclusions.

3. *Carbonaceous Slate.*

These are represented by specimens from the Guadalupe River, one-half mile below Real, and from various points along the Gallo Cañon.

They are usually black, fine-grained rocks of decidedly slaty structure; films of brown biotite, composed of minute scales, occur on the stratification planes.

Under the microscope they prove to consist of alternating bands of coarser and finer quartz-feldspar aggregates, the grains of which are well defined and join sharply. The quartz grains show numerous fluid inclusions, partly with moving bubbles. The liquid is often of a brownish color. Films of chestnut-brown biotite, and also isolated minute foils of the same substance are scattered through the rock.

There is also much carbonaceous substance, usually arranged in streaks and bands, following the more fine-grained parts of the rock; it appears as small grains of irregular, often elongated shape. That this material is to great extent, at least, formed by carbon, is proved by igniting the rock, when it loses much of its dark color.

In one specimen, the coarser quartz grains are filled with dark, short rutile-needles (Thonschiefernadelchen), and also contain some larger, yellow, knee-shaped rutile crystals.

V.—DIABASE.

In the section of metamorphic slate exposed along the Gallo Cañon, and especially near the eastern granite contact, there are great masses of dark, fine to middle-grained diabases. They do not generally have a slaty structure, and still the field observations would indicate that they belong to or are intimately connected with the metamorphic series. Some distance west of the divide between San Rafael Valley and Gallo Creek these rocks end with quite a sharp contact towards the granite, to begin again with a similar contact in the first foothills of the valley.

Diabases are also found near the granite contact just west of Real del Castillo. Under the microscope these rocks prove to have a composition identical with that of diabase, while the structure varies considerably in different specimens. All are more or less uralitized, a process which is generally considered to indicate dynamo-metamorphic action; this fact thus also tends to prove that the diabases form a part of the highly compressed slate series. The most plausible view is, perhaps, to regard them as heavy effusive masses poured out on the bottom of the sea, in which the sediments of the metamorphic slate series once accumulated or as intrusives in the slates before their compression. Neither the collection nor the observations are extensive enough for a detailed examination as to the genesis and relations to other parts of the slate series. Some of these rocks are certainly eruptive diabases or dynamo-metamorphic forms of these, while it is not impossible that others may be products of recrystallization of clastic rocks, induced by dynamic processes.

A specimen from the head of Gallo Cañon, near the granite contact is macroscopically a greenish-gray middle-grained diabase; in thin section it is seen to have a hypidiomorphic diabasic-granular structure, consisting of lathlike, clear and striated plagioclase crystals, probably oligoclase or andesine and allotriomorphic augite, slightly brownish, filling the interstices between the former. The augite is extensively uralitized, while the resulting uralite again is decomposing into aggregates of chlorite and serpentine.

In another specimen from the foothills of San Rafael Valley, along the road from Ensenada to Real, the uralitization has progressed still further; the lathlike feldspar crystals are still visible, and between them lies a little quartz in grains, the shape of which is determined by the former. No augite remains; the irregular grains of a light green uralitic hornblende (a, light yellowish; b, brownish-green;

c, bluish-green), are partly chloritized, and, besides, fine needles of actinolite are scattered throughout the rock.

In a specimen from Gallo Cañon, the uralitization is also complete, and often the feldspar grains, irregular or lath-like, are surrounded by uralite grains in a peculiar manner, so as to give a somewhat clastic appearance to the rock.

Using the term metamorphic in its wider sense, we may refer to the rocks described under IV and V, as the *metamorphic series*. The general character of this series is not unlike that of the Sierra Nevada, in which altered clastic rocks, distinctly stratified, frequently alternate with massive or imperfectly slaty diabases; it is also auriferous, containing, for instance, at Real del Castillo and other places, numerous quartz veins with free gold.

Gneisses and true mica schists are absent except, perhaps, near the granite contacts, where the slates often become strongly micaceous.

The age of this auriferous slate series of Baja California must, for the present, remain uncertain. From the occurrence of unaltered, nearly horizontal cretaceous strata on the west coast we may, however, conclude it to be pre-cretaceous. On the other hand, there does not appear any reason why it should be regarded as Archæan. There are in the Sierra Nevada, at least, strata of carboniferous age or even possibly younger, fully as highly altered as those here discussed.

DESCRIPTION OF A NEW THRUSH FROM CALAVERAS
COUNTY, CALIFORNIA.

BY L. BELDING.

Turdus sequoiensis, sp. nov.

BIG TREE THRUSH.

Sp. char.—In size between the Dwarf and Audubon's Thrushes. In color paler than either or any American thrush I have ever seen; both above and below considerably resembling *T. aliciae*, the spotting included, while its cheeks are still grayer than in *aliciae*. Tail and coverts about as light cinnamon as in *T. auduboni*. Lores, superciliary, orbital ring and under parts pure white; sides and flanks pale brownish white or ashy, a very slight trace of yellow on the breast; a tinge of buff in the band on under side of wing, this band being nearly pure white. Exposed parts of primaries much lighter than back; inner webs of quills brownish. Feet and tarsi very pale in fresh specimens. First quill longer than the fifth and shorter than the fourth; second and third about equal. Terminal inch or more of outer web of second, third and fourth primaries, attenuated, in this agreeing with the Dwarf and Audubon's Thrushes, and disagreeing with *T. ustulatus* and its varieties.

♂ Type specimen in best breeding plumage, shot by myself at Big Trees, May 26, 1889. (No. 326, Collection of California Academy of Sciences). Wing, 3.80; tail, 3.05; tarsus, 1.15; tip of bill to nostril, .40; to forehead, [culmen] .70 inches.

♀ Type specimen, shot by myself, same locality, May 23, 1889. (No. 327, Collection of California Academy of Sciences.) Wing, 3.65; tail, 3.00; tarsus, 1.16; tip of bill to nostril, .40 inches.

A female which I shot at Big Trees June 25, 1883, has a

wing measurement of 3.75 inches, and although in worn breeding plumage, is otherwise quite as large as the above described male.

The only nest found was in a hazel bush (*Corylus*) about three feet from the ground; was about five inches across the top and about half as deep; composed of small roots and lined with shreds of the bark of incense cedar (*Librocedrus*), with moss, lichens and dead leaves on the exterior.

The nest contained two quite fresh eggs; they were unspotted, nearly the color of a robin's egg and measured .85 x .65; .83 x .63 inches. I shot the female parent as she flew from the nest, kept her and the nest, but sent the eggs to Mr. Chas. N. Comstock, who had previously found the nest. I informed him that they were the eggs of the dwarf thrush and he published them as such.

I attributed the paleness of this and other individuals I saw occasionally here, in summer, during the past ten years or more, to lateness of the season, but on June 10, 1888, I shot a male in good plumage and concluded that it was worthy of varietal or specific rank, and a recent comparison of specimens of this with specimens of *T. aonalaschkæ*, *T. aonalaschkæ auduboni*, *T. aonalaschkæ pallasii* and others, mostly furnished by the kindness of Prof. Robert Ridgway from the National Museum, convinces me that it is entitled to the latter.

The absence of olive and almost entire absence of buff from its plumage together with its paleness, distinguishes it at once from any of the small thrushes of America. Except for the cinnamon of the tail it most resembles a faded *aliciæ* from Alaska. The fact of its laying eggs like those of *aonalaschkæ*, *auduboni* and *pallasii* and having the rufous tail of these forms does not establish the other fact that it is but a variety of these.

Habits and songs, especially the latter, may go far towards fixing its true relationship.

**DESCRIPTIONS OF THE NESTS AND EGGS OF SOME LOWER
CALIFORNIAN BIRDS, WITH A DESCRIPTION OF THE
YOUNG PLUMAGE OF *GEOTHLYPIS BELDINGI*.**

BY WALTER E. BRYANT.

***Geothlypis beldingi* Ridgw.**

BELDING'S YELLOW-THROAT.—This warbler was first known from specimens taken at San Jose del Cabo in April, 1882, by Mr. L. Belding, but the eggs have since remained unknown so far as the obtaining of an authentic nest is concerned.

In the Proceedings of the U. S. National Museum (Vol. V, p. 546), Mr. Belding says: "Their habits are quite like those of *G. trichas*, and the eggs not materially different, if a nest found by my guide on the Miraflores and Todos Santos trail May 6, belonged to this species, as I supposed it did, having seen a fine male near the spot from which it was taken."

As these eggs were not preserved, the eleven herein described are presumably the first and only ones known.

In March and April, 1888, I found this species breeding at Comondu, Lower California, the only locality in which I found it that year, and the most northern point (at that time) from which it had been obtained. No nests were found during March, 1888, and by April the young were flying.

I was fortunate in visiting Comondu during the latter part of March of this year, and made a special effort to collect the eggs of this species, and by offering a cash reward interested some Mexican boys in the search. This resulted in five nests being found, from four of which eggs were taken, eleven specimens in all.

To Mr. T. S. Brandegee, the well known botanist, who accompanied me, is due the credit of finding the first

nest, March 25, 1889 (set No. 881, coll. W. E. B.) This was discreetly left undisturbed until I could be shown to the spot a few hours later. The nest was loosely woven in a clump of "cat-tails" (*Typha*) one metre above running water. It is composed outwardly entirely of dry leaves of the "cat-tail," and thinly lined with fine fiber and a few horsehairs. It measures externally (as nearly as can be determined from its rough shape) not less than 150 mm. in height by about 115 mm. in diameter. The receptacle is about 55 mm. in depth, with a diameter at the top of 50 mm. The general appearance is almost identical with some song sparrows' nests. When taken the eggs were cold and the birds absent, although the female was seen when it was first found. In size the eggs are larger than any other North American yellow-throat, measuring 19 x 15; 19.5 x 15; 19.5 x 14.5; 19.5 x 14.5 millimetres. They are white, with shell spots and dots of lilac-gray and a few surface spots and pencillings of black. There is but little variation from this pattern in the markings of the other sets mentioned later.

The Mexican boys were emphatically instructed that whatever nests were found they were to be left until I could be shown to the place. The same day that Mr. Briandegge found the set of four, a bright little fellow came to camp with the information that he had found a nest containing three eggs. This was in quite similar situation to the other, but placed not more than half a metre high. On March 27 the nest and eggs were taken, incubation having commenced. The nest is of the same material as used in the other, but is smaller exteriorly. This set (No. 880, coll. W. E. B.) measures 19.5 x 15.5 mm. with each egg.

On March 28 I found a third nest in a heavy growth of "cat-tails" near the outer edge of the clump, and placed one and one-half metres high. This nest, like the others, is composed of "cat-tail" leaves, but is lined almost exclusively with black horsehairs, so few being used that they do

not even hide the structural material. The two eggs which were in the nest when found were not taken until March 31, when they contained small embryos. Although these two eggs constituted a *set*, I do not consider it a normal one, but lacking in number from some cause unknown. The diameter of each specimen is 19.5×15 mm.

The female was sitting at the time I went to take the nest, but quietly retreated amongst the rushes and made no demonstration, further than a coarse "tchep" note.

Two other nests, one containing two fresh eggs and the other new, were shown to me by Mexican boys April 3; my departure from Comondu on that day prevented me from securing more than these two additional eggs, which measure 19.5×14.5 and 19.5×15 millimetres.

A young bird, the plumage of which has, I believe, never been described, was taken at Comondu, April 18, 1888. It was attended by the female, which exhibited considerable solicitude for its safety.

Young (No. 3211, *immature*, coll. of W. E. B. from Comondu, Lower California).—Above, uniform dark olive-brown. Below, sides, and under wing coverts, light yellowish-buff. Faint indications of light superciliary stripe. Wings above, dark olive-green with distinct greenish edging to outer web of each feather except the first, which has a whitish edging the same as adults. Greater wing coverts, rusty on edges. Tail, olive-green above, lighter below. A few feathers of the fall plumage are just showing on the sides of the breast; otherwise the specimen seems to be in first plumage.

***Melospiza fasciata rivularis* Bryant.**

BROWN'S SONG SPARROW.—Nest building begins about the middle of March with this bird at Comondu. In 1888 I found them sitting, March 12. This year I prepared a female taken at Comondu, March 22, at 7 A. M., which contained a

fully developed egg, apparently the last of a set; size 19.5×16 millimetres.

The first nest obtained was found by a Mexican boy at Comondu, March 27, 1889. It was built less than one metre above the ground, in a thick growth of "cat-tails." The situation being quite similar to the sites chosen by Belding's Yellow-throat.

The nest is composed outwardly of narrow, loosely laid leaves of "cat-tails." The interior is first lined with a thin covering of fine strips of "cat-tail" leaves and a few fibres; over this is a thick covering of hairs. In size the nest is like the usual build of song sparrows.

The eggs, four in number, contained large embryos. They are pale, greenish white, thickly speckled and blotched with reddish brown, forming a dense ring about the larger end. Underlying the brown markings are irregular spots of pale lavender.

This set (No. 882, coll. of W. E. B.), measures 21.5×15.5 , 21.5×15.5 ; 21×16 ; 21×15.5 millimetres.

On April 21, 1889, I found a set of three (No. 891, coll. of W. E. B.), in a nest built amongst "cat-tails" half a metre above a pool of water; it has the appearance of a double nest, being about twice the usual height. The eggs vary so much that they look like a composite set, incubation was equally advanced in all. They measure 20×14.5 ; 19×14.5 ; 18.5×14 millimetres. Five other specimens, two from Comondu and a set of three from San Ignacio, have an average size of 19.5×15 millimetres.

***Carpodacus frontalis ruberrimus* Ridgw.**

RIDGWAY'S HOUSE FINCH. — Most of the nests of this variety at Comondu were in palm trees and well nigh inaccessible. A nest containing two fresh eggs (set No. 885, coll. of W. E. B.), was collected March 31 from the under side of a veranda awning of an *adobe* house; it was built amongst thick vine branches at an altitude of about four meters.

The nest was like similar ones of this genus adapted to the space wherein it was built, and composed of such material as was nearest at hand. In this case rootlets, a bit of rag and considerable wild cotton, enter into the external composition, while a few soft shreds from plant stalks, a quantity of wild cotton, and lastly, some horsehairs complete the interior.

Both birds were about while the nest was being removed; the male was intensely bright colored. A few days later this pair began another nest under the same roof near the old site.

The eggs are not distinguishable from eggs of *C. frontalis* from California. They are sparsely marked with black in an irregular wreath about the larger end. In size they measure 18.5 x 15 and 19 x 15 millimetres.

***Aphelocoma californica hypoleuca* Ridgw.**

XANTUS'S JAY.—A single nest of this new variety was found by myself a few miles southward from San Ignacio on April 12, 1889. The nest was built about three metres high in a green acacia near the trail. The female was sitting, and did not fly until preparations for climbing the tree had commenced. The nest was in quite an exposed situation amongst scant twigs on a horizontal branch. It is composed of small loosely laid dry twigs, and a shallow receptacle lined with fibre and horsehair.

The eggs, three in number (set No. 899, coll. of W. E. B.), contained small embryos. They are more finely spotted than some similar jay's eggs, with shell spots of pale lilac-gray and surface spots of pale olive-green. The ground color is dull, pale glaucous green. They measure 27.5 x 20.5; 27.5 x 21; 27 x 21 millimetres.

**PROVISIONAL DESCRIPTIONS OF SUPPOSED NEW MAMMALS
FROM CALIFORNIA AND LOWER CALIFORNIA.**

BY WALTER E. BRYANT.

Sciurus fessor nigripes Sub-p. nov.

BLACK-FOOTED GRAY SQUIRREL.

For the past five years I have known of the existence of two different gray squirrels inhabiting this State, but have not, until a year ago, been able to ascertain from taxidermists and market men the locality where the rarer of the two forms (*nigripes*) had been taken. During the fall of 1888 I examined about twenty specimens of this new variety in the flesh from San Mateo County, and about the same number of *S. fessor* from the foot-hills of the Sierra Nevada, as they were offered on sale in the markets. There is no trouble to recognize at a glance the differences which are so strongly marked in the gray squirrels of the Sierra region and those of the redwood, coast region south of San Francisco. The intergradation I surmise occurs northward, judging from four specimens just collected by Mr. R. C. McGregor in Mendocino County, but these are in poor condition, and not all of them adults.

I regret that it is not possible to give measurements of the two forms (taken from fresh specimens) as well as cranial character, at present, but the following will serve to distinguish the black-footed variety.

Subsp. char.—General color of upper parts much darker than *S. fessor*, particularly upper surface of tail. Upper surface of manus, dark gray or black. Upper surface of pes, black, sometimes with a sprinkling of gray on toes. Entire absence (in majority of specimens) of light tawny ochraceous at base and posterior surface of ears. Dorsal region and

scapulars marked by a pale yellowish-brown suffusion extending nearly or quite to the tail. Orbital ring and under surface of body and legs, pure white.

Habitat.—Coast region of California south of San Francisco.

Spermophilus grammurus atricapillus Subsp. nov.

BLACK-CAPPED GROUND SQUIRREL.

In 1888 I examined several specimens of the lined-tailed spermophile inhabiting the rocky region at Comondu, Lower California, and brought back three skins, representing the widest difference in those individuals. The striking peculiarity of the black crown and blackish scapular region suggested at once a peninsular form of this variable spermophile. When revisiting Comondu, in March of this year, I engaged several Mexican boys to trap ground-squirrels for me, which they did with most satisfactory results; the entire series numbering twenty-nine complete skins and one scalp, are now before me, and upwards of a dozen others were examined in the flesh, but not preserved. In this collection are two small young, but the majority are adults.

There is considerable individual variation shown in specimens from the same locality. As I traveled northward I found amongst the squirrels which were taken a strong tendency to depart from the typical form and approach in color *S. grammurus*. How far south on the peninsula typical *beecheyi* may extend has never been determined; none of those collected are quite referable to it. Regarding the three most variable specimens (those of 1888) Dr. Merriam writes: "Your *Spermophilus grammurus atricapillus* agrees with other specimens I have seen from northern Mexico. In my opinion it represents one stage in the series of intergrades which should connect typical *grammurus* with typical *buckleyi*. It has nothing to do with *beecheyi* proper, although I must confess that except for size one of your females agrees

almost exactly with some of my specimens collected near San Francisco; but *beecheyi* varies greatly in the distinctness of its gray shoulder stripes, as you must have observed if you have any sort of series."

Measurements taken from fresh specimens, also cranial dimensions, will be given in a later paper.

Subsp. char.—Similar in color to *S. grammurus*, but having top of head, black; neck, scapulars and interscapulars, black, blending with anterior dorsal region and sides; dark area, exclusive of crown, mottled or sprinkled with gray. Orbital ring, white.

Habitat.—Central and southern portions of Lower California; (Northern Mexico?).

PRELIMINARY NOTES ON SOUTH AMERICAN
NEMATOGNATHI.

II.

BY CARL H. EIGENMANN AND ROSA SMITH EIGENMANN.

The present paper is a continuation of the Preliminary Notes which appeared in the Proceedings of the California Academy of Sciences, 2d Ser., Vol. I, pp. 119-172. It contains several forms omitted in the preceding paper, a list of the genera and species of Loricariidæ exclusive of the genus *Plecostomus*, *Bunocephalidæ* and *Pygididæ*, with descriptions of the following new forms:

1, *Acentronichthys*; 2, *A. leptos*; 3, *Nemuroglanis*; 4, *N. lanceolatus*; 5, *Steindachneria doceana*; 6, *Platystoma fasciatum reticulatum*; 7, *Pl. fasc. nigricans*; 8, *Pl. fasc. brevefile*; 9, *Tachisurus upsulonophorus*; 10, *Farlowella*; 11, *F. carinata*; 12, *Loricaria panamensis*; 13, *L. brevirostris*; 14, *L. lata*; 15, *L. phoxocephala*; 16, *Oxyropsis*; 17, *O. wrightiana*; 18, *Hisonotus*; 19, *H. notatus*; 20, *Microlepidogaster*; 21, *M. perforatus*; 22, *Parotocinclus*; 23, *Neoplecostomus*; 24, *Rhinelepis lophophanes*; 25, *Panaque*; 26, *Delturus*; 27, *D. parahybæ*; 28, *Hemipsilichthys*; 29, *Ancistrus chagresi*; 30, *A. stigmaticus*; 31, *A. cirrhosus dubius*; 32, *Bunocephalus scabriceps*; 33, *Pygidium oroyæ*; 34, *P. immaculatum*; 35, *Tridens*; 36, *T. melanops*; 37, *T. brevis*; 38, *Pseudostegophilus*; 39, *Stegophilus intermedius*; 40, *Miuroglanis*; 41, *M. platycephalus*.

SILURIDÆ.

VI. c. ACENTRONICHTHYS gen. nov.

Type, *Acentronichthys leptos* sp. nov.

Caudal widely forked; occipital process small, not con-

tinued to the dorsal; fontanel extending to base of occipital process. Orbit without a free margin. Dorsal and pectoral without spines; ventrals under anterior half of dorsal; anal long. Allied to *Heptapterus*.

Acentronichthys leptos.

Type, No. 7532; one specimen, .105 m. Sao Matheos, Hartt & Copeland.

Extremely elongate, depth of caudal peduncle little less than the greatest depth.

Eye minute, one orbital diameter nearer to tip of snout than to end of opercle. Maxillary barbels reaching beyond middle of pectoral. Adipose fin long and low, its origin in advance of the anal, *confluent with the caudal fin*. Caudal with numerous accessory rays. Ventrals inserted below the *first dorsal ray*. Brownish, with traces of a dark lateral band; a dark bar extending forward from eye; two dark lines on base of caudal and parallel with its root.

Head $7\frac{1}{2}$; depth 10; D. 7; A. 19.

XV. b. NEMUROGLANIS gen. nov.

Type, *Nemuroglanis lanceolatus* sp. nov.

This genus belongs to the Pimelodinae with teeth on the vomer; its relationships are not well made out.

Caudal long lanceolate; adipose fin long and low, joined to the caudal. No evident occipital process. No bucklers in front of the dorsal which is placed over the ventrals. Vomer with teeth.

Nemuroglanis lanceolatus.

Type, No. 8169; one specimen, .035 m. Jutahy, Thayer Expedition.

Elongate slender, tail compressed, head and body depressed.

Eye $2-2\frac{1}{2}$ in snout which is equal to the interorbital, and $2\frac{3}{4}$ in the head.

Maxillary barbels reaching beyond origin of the dorsal.

Dorsal without spine or basal plate. Caudal rays rapidly tapering to the middle ones which are greatly prolonged, less than $2\frac{1}{2}$ in the length.

Uniform yellow.

Head $4\frac{1}{2}$; D. 7; A. 13.

XVIII. STEINDACHNERIA Eigenm. & Eigenm.

Steindachneria doceana sp. nov.

Types, Nos. 23792; 23793; 23794; nine specimens, .37-.74 m. Rio Doce.

Head broad, depressed, the depth at the base of the occipital process $2\frac{1}{2}$ -3 in its length, its width $1\frac{1}{2}$. Occipital process broad, not quite reaching the long, triangular dorsal plate.

Teeth of the vomer in a single patch.

Maxillary barbels reaching to middle of dorsal in the smallest, to middle of pectoral in the largest specimen.

Base of adipose $\frac{1}{4}$ - $\frac{1}{2}$ longer than base of anal.

Caudal emarginate.

Ground color light; sides and back marked with dark brown; only spots and curved bars of the ground color visible on the head and back; on the sides the color is about equally distributed in vermiculating stripes. Unpaired, and upper surfaces of the paired fins, light, profusely spotted with dark; the spots of the dorsal and pectoral confluent into bars and stripes in the largest specimen; adipose fin colored like the back; ventral surface and lower surface of the paired fins plain.

Head $3\frac{2}{3}$ - $3\frac{1}{2}$; depth $6\frac{1}{2}$ - $7\frac{1}{2}$; Br. 8-9; D. I, 7-8; A. 14.

The genus *Steindachneria* is confined, so far as known, to the rivers Parahyba, Jequitinhonha and Doce, each of which has a distinct species.

XXI. PSEUDOPLATYSTOMA Bleeker.

Pseudoplatystoma fasciatum reticulatum var. nov.

Type. No. 23813; length .77 m. Rio Negro.

Sides and back with narrow black lines forming coarse reticulations; a series of large round black spots on the lower part of the side; all the fins spotted with black. Maxillary barbels reaching little beyond base of pectorals, the post-mentals reaching somewhat farther.

***Pseudoplatystoma fasciatum nigricans* var. nov.**

Types, Nos. 7301 and 7311; two specimens, .40-.60 m. Xingu.

Black above, gradually shading into light below; lateral bars of the abdominal region extending to the edge of the belly; a series of large black spots along the lower parts of the sides; all the fins conspicuously spotted. Maxillary barbel reaching to origin of dorsal.

***Pseudoplatystoma fasciatum brevefle* var. nov.**

Type, No. 7317; one specimen, .62 m. Goyaz, Senhor Honorio

Vertical bars of abdominal region broken up into spots, those of the caudal region widened at their lower termination; a series of very large lateral spots on lower part of sides. Maxillary barbels reaching to edge of opercle.

XXV. TACHISURUS Lacépède.

***Tachisurus upsulonophorus* sp. nov.**

Type, No. 23750; one specimen, .33 m. Rio Grande do Sul.

Closely related to *T. platypogon* (Günther) from which it may be distinguished by the following characters:

platypogon.

Inner margins of palatine patches of teeth straight; the distance between them equal to the diameter of the pupil.

Fontanel abruptly continued as a groove.

Granulations of the head fine, irregularly scattered.

Anterior margin of the dorsal spine with sharp straight teeth.

upsulonophorus.

Inner margins of palatine patches of teeth concave, the distance between them greater than the longitudinal diameter of the eye.

Fontanel gradually merging into a groove.

Granulations of the head coarse, arranged in series.

Anterior margin of the dorsal spine with granules.

Eye large, $2\frac{1}{2}$ in snout, $6\frac{1}{2}$ in head, 3 in interocular.

Maxillary barbels reaching little beyond base of pectoral.

Snout somewhat blunt, less decurved than in *platypogon*;
upper jaw slightly projecting; teeth villiform.

Gill membranes forming a narrow fold across the isthmus.

Vertical series of pores on the sides of the body.

Distance of dorsal fin from tip of snout little more than
 $2\frac{1}{2}$ in the length, the spine $1\frac{2}{3}$ in the head.

Adipose fin as long as the dorsal fin minus the fulcrum.

Caudal widely forked, $3\frac{2}{3}$ in the length.

Anal little longer than high, deeply emarginate.

Metallic blue, shading into silvery below; inner surface
of the pectorals wholly blue-black except the posterior
margin which is light; ventrals lighter, similarly marked.

Head $3\frac{2}{3}$; depth $5\frac{1}{2}$; D. I. 7; A. 17.

LORICARIIDÆ.

I. FARLOWELLA nom. gen. nov.

Acestra Kner 1853, preoc. in Hem., Dall, 1852.

We have dedicated this genus to Dr. W. G. Farlow of
Harvard University.

1. *Farlowella gladiola* (Günther).

2. *Farlowella carinata* Garman MS., sp. nov.

Types, Nos. 7742; 7769; 7770; 7771; 7773; 9830; fifteen specimens,
.10-.22 m. to base of caudal. Santarem; Tefé; Gurupa; Obidos;
Jutahy; Tabatinga.

Body little depressed, subterete; tail much depressed.
Snout long, greatly varying in length in specimens from
different localities; upper margin of gill opening equidis-
tant from tip of snout and somewhere between the posterior
end of dorsal fin and posterior margin of third scute behind
the dorsal fin; plates along margin of snout finely granular,
or swollen at center and more coarsely granular. Temporal
plate with coarse vermiculating ridges. Interorbital flattish.

Orbit $3-3\frac{1}{2}$ in the interorbital. Anterior half of occipital slightly tumid, the occipital sometimes having obscure X-shaped ridges which are continued as two parallel ridges on the nuchal plates.

Soft parts of the mouth in an oval depression; teeth fine, numerous; barbels obsolete. Region between mouth and pectoral fins with marginal plates only in the young, with irregular polygonal plates in the adult.

Belly with two series of plates, each with a median keel. Anal plate arrow-shaped, a small unpaired plate before it; an elongate plate before the anal fin. Dorsal plate elongate, separating one or two paired plates; six or seven paired plates between the dorsal plate and the occipital. Sides of the body covered with two series of obscurely keeled plates which coalesce above or slightly behind the anal; 20-22 paired plates between the dorsal and caudal fins.

Distance of dorsal fin from tip of snout $2-2\frac{1}{4}$ in the length; dorsal fin about three times as high as long, the first ray highest.

Outermost caudal rays elongate, varying from the length of the snout to much longer than the head.

Anal fin well developed, inserted under third or fourth dorsal ray, little lower than dorsal fin.

Pectoral fins short, not reaching the ventrals, ventrals not to the anal fin.

Light olivaceous to dark brown, the rays of all the fins barred; each caudal lobe with a narrow, dark brown stripe, sometimes with a few flecks of light across it; base of caudal sometimes with a large dusky spot.

Length of head to end of occipital plate $2\frac{7}{8}-3\frac{3}{4}$ in the length.

D. 7; A. 6; V. 5; P. 7; lat. l. 30-34.

3. *Farlowella knerii* (Steindachner).

4. *Farlowella oxyrrhynchus* (Kner).

5. *Farlowella amazona* (Günther).

6. *Farlowella acus* (Kner).

Loricaria scolopacina Filippi.

II. HEMIODONTICHTHYS Bleeker.

7. *Hemiodontichthys acipenserinus* (Kner).

Localities: Manacapuru; Hyavary.

III. LORICARIA Linnaeus.

Sturisoma Swainson; *Hemiodon* Kner; *Loricariichthys*, *Pseudoloricaria*, *Parahemiodon*, *Hemiloricaria*, *Pseudohemiodon*, *Rineloricaria* and *Oxyloricaria* Bleeker.

DOUBTFUL SPECIES OF LORICARIA.

I. *Loricaria platyura* Müller and Troschel. II. *Hemiloricaria caracasensis* Bleeker. III. *Loricaria bransfordi* Gill. IV. *Loricaria cadeæ* Hensel.

‡ *Hemiodon*.

8. *Loricaria depressa* Kner.

9. *Loricaria panamensis* sp. nov.

Type, No. 8126; one specimen, .95 m. to base of caudal. Panama. Dr. Hernberg.

Body little depressed. No keels on the head or on the nuchal plates. Shields and scales hispid; a large naked area about the mouth.

Orbit without a notch, 4 in the snout, 7 in head, $1\frac{3}{4}$ in interorbital.

Teeth fine, numerous in both jaws.

Five series of plates on the belly; anal plate as long as broad; lateral keels remaining distinct to the caudal fin, approximated at about the sixteenth lateral scute.

Distance of dorsal fin from tip of snout $3\frac{2}{3}$ in the length; first dorsal ray very high, little less than its distance from the tip of the snout.

Caudal forked, the outermost rays greatly produced.

First anal ray little less than length of head. Ventrals reaching to end of base of anal; pectoral to the vent.

Brownish; dorsal fin dark brown on its first and second membrane and second ray, its other rays spotted; base of caudal and longitudinal stripe on each lobe dark brown; other fins plain; a large blackish area in front of each eye.

Head $4\frac{1}{2}$; D. 8; A. 6; V. I, 5; P. I, 6; lat. 1. 33.

§ *Sturisoma*.

10. *Loricaria rostrata* (Spix.)

L. acuta Cuv. & Val., plate, not descr.; *L. barbata* Kner.

Locality: Manacapuru.

§ *Rineloricaria*.

11. *Loricaria brevirostris* sp. nov.

Type, No. 8095; one specimen, ♂; .21 m. to base of caudal. Iça. James.

Body little depressed anteriorly, its depth $1\frac{1}{2}$ in its width. Depth of the head $1\frac{1}{2}$ in the snout. Head without keels or ridges, its surface and that of all the plates hispid; transverse profile of the occiput regularly convex.

Orbit without a notch, $3\frac{1}{2}$ in snout, 7 in head, 2 in inter-orbital. Anterior profile little concave; snout triangular, acute, little longer than the rest of the head. Margin of head with minute movable bristles. Teeth fine, numerous, well developed in both jaws; upper lip granular, lower lip thickly papillose. Breast and lower surface of the head with numerous irregular plates; belly with five series of plates. Lateral keels coalescing into one keel at about the twentieth scute, the upper keel obsolete in front. Distance of dorsal fin from tip of snout slightly more than 3 in the length. First dorsal ray longer than the head. Rays of the dorsal and caudal faintly spotted, other fins plain.

12. *Loricaria lima* Kner.

! *L. strigata* Hensel.

Localities: Mendez; Santa Cruz; Rio Guenda; Rio Parahyba; Campos; Rio Macacos.

13. *Loricaria magdalenæ* Steindachner.

14. *Loricaria filamentosa* Steindachner.

† *L. bransfordi* Gill.

‡ *Loricaria*.

15. *Loricaria variegata* Steindachner.

16. *Loricaria macrodon* Steindachner.

17. *Loricaria nudiventris* Cuv. & Val.

18. *Loricaria cataphracta* Linnæus.

L. dura Linnæus; *L. cirrhosa* Bloch; *L. setifera* Lacépède; *L. carinata* Castelnau; *Plecostomus flagellaris* Gronow.

Localities: Vigia; Sao Gonçallo; Cameta; Manaus; Para; Rio Negro; Coary; Villa Bella; Gurupa; Rio Preto; Tajapurú; Porto do Moz; Teffé; Marañon; Ucayale; Obidos.

19. *Loricaria lata* sp. nov.

Types, No. 8123; eleven specimens; .11-.27 m. to base of caudal; Goyaz. Senhor Honorio.

Body everywhere greatly depressed, the depth about $1\frac{1}{2}$ in the width; the width at origin of anal equals snout and orbit in the adult, equal to the snout alone in young. Head depressed, its depth considerably less than length of snout, its width little longer than its length to upper angle of gill opening. Posterior half of occipital with two inconspicuous keels. Humeral plate without keels.

A shallow, rounded orbital notch; interorbital very slightly concave. Eye $3\frac{1}{4}$ - $4\frac{1}{2}$ in snout, 7 - $8\frac{1}{2}$ in head, $1\frac{1}{2}$ - $1\frac{1}{2}$ in the interorbital. Snout pointed, its margin entirely granular. Lips margined with cirri, the lower lip emarginate, its surface also covered with cirri. Teeth few, large, those of the upper jaw longer.

Nuchal plates faintly bicarinate: lateral keels rather prominent, approximated on the 20th scute; breast and belly with numerous small plates, or almost wholly naked in specimens .10 m. long to base of caudal.

Distance of dorsal fin from tip of snout 3 in the length.

Caudal fin injured. Anal fin as high as the ventrals.

Outer ventral ray greatly thickened and prolonged, reaching beyond origin of anal fin.

Pectorals higher than the ventrals, reaching beyond base of the latter.

Coloration uniform in adult (?), all the fins dusky; young with five dark cross bars which are most prominent on the sides; all the fins more or less spotted; upper lip and barbel dotted.

20. *Loricaria macromystax* Günther.

21. *Loricaria vetula* Valenciennes.

22. *Loricaria lamina* Günther.

23. *Loricaria platystoma* Günther.

‡ *Pseudoloricaria*.

24. *Loricaria læviuscula* Cuv. & Val.

Localities: Rio Madeira; Rio Trombetas; Coary; Jutahy; Porto do Moz; Manaus; Fonteboa; Lake Jose Assu; Gurupa; Silva, Lake Saraca; Xingu; Tonantins; Hyavary.

‡ ?

25. *Loricaria brunnea* Hancock.

‡ *Pseudohemiodon*.

26. *Loricaria platycephala* Kner.

‡ *Parahemiodon*.

27. *Loricaria uracantha* Kner & Steindachner.

28. *Loricaria stubelii* Steindachner.

Localities: Santarem; Hyavary; Tefé; Rio Preto; Rio Puty.

29. *Loricaria spixii* Steindachner.

Localities: Santa Cruz, Rio Guenda; Sambaia; Mendez; Campos; Muriahe; Sao Matheos.

30. *Loricaria typus* (Bleeker).

Loricaria hemiolum Günther.

31. *Loricaria phoxocephala* sp. nov.

Types, No. 8030; two specimens .14-.15 m. to base of caudal. Coary. L. Agassiz.

This species can readily be distinguished by its pointed snout and by the bars on its head.

Head long, pointed, the snout acute; depth of the head $1\frac{1}{2}$ in its width; occipital with scarcely evident keels; interorbital convex; anterior profile concave; tip of snout naked. A narrow orbital notch. Eye $3\frac{2}{3}$ in snout, 7 in head, $1\frac{1}{2}$ in the interorbital.

Lower surface of the head naked; teeth numerous and well developed in both jaws; thoracic plates small, the anterior margin of the mailed ventral region truncate, in a line with the gill-openings. Five longitudinal series of ventral plates; anal plate and the plates anterior to it as in *L. teffeana*; nuchal plates obscurely bicarinate; lateral keels becoming more or less entirely coalesced on the 15th plate.

Distance of dorsal fin from tip of snout $3\frac{1}{2}$ – $3\frac{1}{4}$ in the length; first dorsal ray higher than length of head; outermost caudal rays produced; anal fin higher than ventrals or pectorals.

Light brown with six broad cross-bands, the first on the nape, the second under origin of dorsal fin; a dark band forward from eye, a narrower one down from eye; head and anterior half of body with black pores; dorsal slightly dusky, obscurely spotted, its base with a few spots; base of caudal and a band parallel to its margin dark brown; anal and ventrals light; pectoral like the dorsal.

Head $4\frac{1}{2}$ –5; lat. l. 29.

32. *Loricaria anus* Valenciennes.

Locality: Rio Grande do Sul.

§ *Loricariichthys*.

33. *Loricaria acuta* Cuv. & Val.

L. castanea Castelnau; ? *L. maculata* Günther.

Localities: Villa Bella; Lake Hyannary; Cudajus; Maubos, on the Rio Negro; Xingu Cascade; Lago Alexu; Obidos; Coary; Tefé.

34. *Loricaria maculata* Bloch.

L. amazonica Castelnau; *Pl. calaphracta* Gronow.

Localities: Coary; Santarem; Iça; Hyannary; Obidos; Tefé; Jutahy.

35. *Loricaria konopickyi* Steindachner.
L. maculata Val.; *L. valenciennesi* Vaillant.
36. *Loricaria lanceolata* Günther.
37. *Loricaria teffeana* Steindachner.
 Localities: Cudajas; Tonantins; Tefé; Jutahy; Lago Alexo; Tabatinga.

IV. *HARTTIA* Steindachner.

38. *Harttia loricariformis* Steindachner.
 Localities: Rio Parahyba; Itabapua; Muriahe.

V. *OXYROPSIS* gen. nov.

Type, *Oxyropsis wrightiana* sp. nov.

This genus differs from *Hurtia* as *Hypoptopoma* differs from *Otocinclus*.

The head is depressed, the eyes marginal, the orbit infringing slightly on the lower surface of the head. Tail depressed. A lateral keel. Belly covered with granular plates. Adipose fin none.

39. *Oxyropsis wrightiana* sp. nov.

Type, No. 8055; one specimen, .037 m. to base of caudal. Lake Hymanuary. L. Agassiz.

Depressed, elongate, the depth about 2 in the width. Head depressed, the snout rounded; occipital margined by two nuchal plates; interorbital convex; nares above the anterior margin of the orbit. Surface of the head and all the scutes with longitudinal series of small spines: no keels on the head. Lower surface of the head as in *Hypoptopoma*.

Eye $2\frac{1}{2}$ in the snout, $5\frac{1}{2}$ in the head, $2\frac{1}{2}$ in the interorbital.

Teeth well developed; lower lip convex, papillous.

Anal groove bounded laterally and posteriorly by a horse-shoe-shaped plate, anteriorly by the large shield-shaped anal plate. Belly with three series of plates which are separated anteriorly; thorax with two pairs of large plates. Four series of plates cover the entire body. The lateral

series of plates has a median keel which is strongest above tip of anal.

Distance of dorsal fin from tip of snout about $2\frac{3}{4}$ in the length; first dorsal ray as high as the space between base of pectoral and tip of snout. Caudal fin broken.

Anal fin as high as length of snout plus the eye. Ventrals short, not reaching the anal. Pectorals extending beyond middle of ventrals, little lower than the first dorsal ray; the spine strongly spiny on its outer margin, almost smooth on its inner margin.

Back marbled; sides with numerous minute dark dots; dorsal rays spotted with dark; middle caudal rays blackish; anal, and inner surfaces of ventrals and pectorals spotted like the dorsal fin.

D. I, 7; A. 6; V. I, 5; P. I, 5; lat. l. 26.

We have dedicated this species to Professor R. Ramsey Wright of Toronto, who has contributed more than any one else to the knowledge of the anatomy of the American Nemato gnathi.

VI. *HYPOPTOPOMA* Günther.

40. *Hypoptopoma thoracatum* Günther.

H. biobatum Cope. *Otocincius joberti* Vaillant.

Localities: Teffé; Obidos; Manacapuru; Iça; ? Rio Negro.

41. *Hypoptopoma gulare* Cope.

42. *Hypoptopoma carinatum* Steindachner.

VII. *HISONOTUS* gen. nov.

Type, *Hisonotus notatus*, sp. nov.

Belly with large plates; eyes superior; humeral plate imperforate.

♀ *Hisonotus*.

Adipose fin none.

43. *Hisonotus notatus* sp. nov.? *Otocinclus maculicauda* Steindachner, in part.

Types, No. 7761; ninety-five specimens, the largest .04 m. long. Santa Cruz. Dom Pedro II.

No. 8177; one specimen .013 m. Juiz de Fora. Thayer expedition.

Body somewhat depressed anteriorly, wider than deep. Head narrow and comparatively high; occipital ending in a triangular process which is bordered by a single nuchal plate; profile rather steep and slightly convex; all the plates of the head strongly hispid; a series of rather large recurved spines margining the granular portion of the snout below. Orbit $3\frac{1}{2}$ in the snout, 7 in the head, 3 in the interorbital.

Ventral surface with about 3 series of irregular plates. Lateral plates strongly hispid, the marginal spines scarcely enlarged.

Distance of dorsal fin from tip of snout little more than 2 in the length; margin of dorsal fin convex. Caudal emarginate.

Pectoral spine not reaching middle of ventrals, its outer margin spiny.

Light brown; caudal with a large median blackish spot which extends to the tip of the middle caudal rays, outer caudal rays yellow.

Head 3; D. I, 7; A. I, 5; V. I, 5; P. I, 6; lat. 1. 25.

Parotocinclus subgen. nov.

Adipose fin present.

44. *Hisonotus maculicauda* (Steindachner).

Locality: Santa Cruz.

VIII. *OTOCINCLUS* Cope.**45. *Otocinclus affinis* Steindachner.**

Locality: Santa Cruz.

46. *Otocinclus vestitus* Cope.

IX. MICROLEPIDOGASTER gen. nov.

Type, *M. perforatus*, sp. nov.

Ventral surface covered with minute granular plates; dorsal fin inserted far posterior to the ventrals; temporal plate perforate.

47. *Microlepidogaster perforatus* sp. nov.

Type, No. 8182; one specimen .032 m. to base of caudal.

Localities: Rio Carandaby, Brazil.

Broad and depressed anteriorly, the depth less than the width. Head broad, depressed, its depth little more than two in its length to the end of temporal plate; its width $1\frac{1}{2}$ in its length. Snout narrow, pointed; loreal region concave. Eye 4 in snout, $8\frac{1}{2}$ in head; interorbital concave, equal to the post-orbital portion of the head.

All of the plates hispid, most so on the tail, not keeled. Lat. 1. 27.

X. NEOPLECOSTOMUS Eigenm & Eigenm.

This subgenus proposed by us (Proc. Calif. Acad. Sci., 2d Ser., Vol. I, p. 171; 1888) may be raised to generic rank.

Tail comparatively long, terete; adipose fin far removed from the dorsal fin; belly with a median, sub-circular patch of granules.

A. 6-8.

48. *Neoplecostomus microps* (Steindachner).

Localities: Juiz de Fora; Goyaz.

49. *Neoplecostomus granosus* (Cuv. & Val.)

XI. RHINELEPIS Spix.

50. *Rhinelepis parahybæ* Steindachner.

Locality: Rio Parahyba, at Barra do Pirahy.

51. *Rhinelepis agassizii* Steindachner.52. *Rhinelepis aspera* Spix.

? *R. strigosa* Cuv. & Val.

53. *Rhinelepis lophophanes* sp. nov.

Type. No. 8164; one specimen .018 m. to base of caudal.

Localities: Santa Cruz, Brazil. Dom Pedro II.

Greatest depth equal to the greatest width. Occipital with three strong spiniferous ridges, a short median one and two longer lateral ones; similar crests extending from posterior margin of orbit to edge of temporal plate. Nasal pits margined by spiniferous ridges. Lower surface of head naked, margined by a series of recurved spines. Coracoid and scapula granular; belly with a small, granular plate between posterior margins of ventrals; a larger plate behind the pectoral. Lateral and dorsal plates keeled.

D. I, 7; A. 6; Lat. 1. 22.

XII. HEMIANCISTRUS Bleeker.*

Pseudacanthicus Bleeker; *Chetostomus* Günther.

We have been able to examine only two species of this genus.

54. *Hemiancistrus histrix* (Cuv. & Val.).
55. *Hemiancistrus serratus* (Cuv. & Val.).
56. *Hemiancistrus spinosus* (Castelnau).
57. *Hemiancistrus medians* (Kuer).
58. *Hemiancistrus pictus* (Kuer).
59. *Hemiancistrus brachyurus* (Kuer).
60. *Hemiancistrus itacua* (Valenciennes).
61. *Hemiancistrus scaphirhynchus* (Kuer).
Localities: Hyauuary; Coary; Teffé; Hyavary.
62. *Hemiancistrus mystacinus* (Kuer).
63. *Hemiancistrus oligospilus* (Günther).
64. *Hemiancistrus schomburgkii* (Günther).
65. *Hemiancistrus guacharote* (Günther).
66. *Hemiancistrus trinitates* (Günther).
Ancistrus guacharote Gill.
67. *Hemiancistrus aspidolepis* (Günther).
68. *Hemiancistrus fordii* (Günther).

*Should *Hypostomus pictus* Castelnau, prove to be a valid species it must be renamed.

69. **Hemiancistrus heteracanthus** (Günther).
 70. **Hemiancistrus megacephalus** (Günther).
 71. **Hemiancistrus vittatus** (Steindachner).
 Localities: Rio Trombetas: Porto do Moz; Tajapuru; Obidos; Avary.

XIII. PARANCISTRUS Bleeker.

72. **Parancistrus punctatissimus** Steindachner.
 ? *Hypostomus niveatus* Castelnau.
 Locality: Porto do Moz.
 73. **Parancistrus aurantiacus** (Castelnau).
 74. **Parancistrus nigricans** (Castelnau).

XIV. COCHLIODON Heckel.

75. **Cochlodon cochlodon** (Kner).
C. hypostomus Heckel; *Loricaria melanoptera* Natterer.

XV. PANAQUE gen. nov.

Type: *Chaetostomus nigrolineatus* Peters.

Teeth enlarged, bowl-shaped at tip, few in each jaw. Interopercle with a bunch of erectile spines.

76. **Panaque nigrolineatus** (Peters).
 Locality: Goynz.
 77. **Panaque cochlodon** (sive gibbosus) (Steindachner).
 78. **Panaque dentex** (Günther).

XVI. PTERYGOPLICHTHYS Gill.

Liposarcus Günther.

79. **Pterygoplichthys undecimalis** (Steindachner).
 80. **Pterygoplichthys etentaculatus** (Spix).
Hypostomus duodecimalis Cuv. & Val. *H. brevitentaculatus* Ranzani;
Ancistrus longimanus Kner.
 Locality: Rio San Francisco below the falls.
 81. **Pterygoplichthys gibbiceps** (Kner).
Liposarcus altipinnis Günther; ? *L. scrophus* Cope.
 Localities: Conry; Teffé; Porto do Moz; Lago Alexo; Cudajas; Lake Hyannary; Santarem; Tabatinga; Lago do Maximo; Jutuby; Villa Bella; Silva, Lake Saracá; Obidos.

82. **Pterygoplichthys punctatus** Natterer.
Ancistrus duodecimalis Kner.
 Locality: Cudajas.
83. **Pterygoplichthys pardalis** Castelnau.
Liposarcus varius Cope.
 Localities: Santarem; Cudajas; Rio Negro; Teffé; Jutahy; Villa Bella;
 Obidos; Tabatinga.
84. **Pterygoplichthys jeanesianus** Cope.
85. **Pterygoplichthys lituratus** Kuer.
 Localities: Rio Preto; Rio Puty; Sao Gonçallo; Xingu Cascade.

XVII. PSEUDANCISTRUS Bleeker.

86. **Pseudancistrus barbatus** (Cuv. & Val.).
87. **Pseudancistrus guttatus** (Cuv. & Val.).
88. **Pseudancistrus depressus** (Günther).
89. **Pseudancistrus setosus** (Boulenger).
90. **Pseudancistrus wertheimeri** Steindachner.
 Locality: Santa Clara, Rio Mucuri.

XVIII. DELTURUS gen. nov.

Type: *Delturus parahybæ* sp. nov.

Dorsal fin adnate; lateral plates well developed; sides of the head with short fine bristles which do not encroach on the preopercle. Tail flat below, trenchant above, a cross section being -shaped.

91. **Delturus angulicauda** Steindachner.
 Locality: Santa Clara, Rio Mucuri.
92. **Delturus parahybæ** sp. nov.
 Types, No. 7726; two specimens .28 m. Parahyba. Thayer expedition.

The differences between the two species of this genus may best be seen from the following key:

- a. D. I, 9. Fins plain; lat. l. 24. *angulicauda*.
- aa. D. I, 10. Fins all spotted; lat. l. 25-27. *parahybæ*.

XIX. HEMIPSILICHTHYS gen. nov.

Xenomystus Lütken, preoc.

93. **Hemipsilichthys gobio** (Lütken.)
Locality: Parahyba.

XX. ACANTHICUS Spix.

DOUBTFUL SPECIES.

Hypostomus vicinus Castelnau.

94. **Acanthicus hystrix** Spix.
Rhinelepis acanthicus Cuv. & Val.
Locality: Para.
95. **Acanthicus genibarbis** (Cuv. & Val.).

XXI. CHÆTOSTOMUS Kner.

96. **Chætostomus jelskii** Steindachner.
97. **Chætostomus latifrons** Günther.
98. **Chætostomus macrops** Lütken.
99. **Chætostomus stannii** Kröyer.
100. **Chætostomus taczanowskii** Steindachner.
101. **Chætostomus tectirostris** Cope.
102. **Chætostomus variolosus** Cope.
103. **Chætostomus nudirostris** Lütken.
104. **Chætostomus guairensis** Steindachner.
105. **Chætostomus sericeus** Cope.
106. **Chætostomus malacops** Cope.
107. **Chætostomus branickii** Steindachner.
108. **Chætostomus fisheri** Steindachner.
109. **Chætostomus loborhynchus** Tschudi.
110. **Chætostomus dermorhynchus** Boulenger.
111. **Chætostomus microps** Günther.
112. **Chætostomus nudiceps** Müller & Troschel.
113. **Chætostomus erinaceus** Cuv. & Val.
114. **Chætostomus bufonius** Cuv. & Val.
115. **Chætostomus gymnorhynchus** Kner.

XXII. ANCISTRUS Kner.

116. *Ancistrus chagresi* sp. nov.*

Types, No. 8026; two specimens ♂ & ♀ .14-.19 m. Rio Chagres. Dr. Maak.

*As all the species of this genus are very much alike the following key will serve to describe the new forms.

- a. Margin of the snout naked, provided with tentacles. The females with a narrow naked margin and a single series of simple tentacles, or without tentacles in *calamita*; males with a much broader naked area, a series of simple marginal tentacles and a Y-shaped series on the middle of the snout.
- b. Lower caudal lobe not produced, scarcely if any longer than the upper; margin of caudal obliquely truncate, a dusky spot at the base of the first dorsal membrane. D. I, 7; A. 4 or 5; lat. l. 24.
- c. Eye $6-7\frac{1}{4}$ in the head; preopercular spines 11-15; median tentacles of the male profusely branched; a small granular patch on the breast below the base of the pectoral. *chagresi* 1.
- cc. Eye 7-10 in the head; preopercular spines 25 or more; median tentacles of the male flattened, mostly simple; breast entirely naked; head broad, depressed; dark brown, thickly covered with light spots which are smallest and most regular on the head; ventral surface lighter; fins dark brown irregularly spotted with light. *stigmaticus* 2.
- bb. Lower caudal lobe produced, much longer than the upper; margin of the caudal sub-truncate
- d. Head longer than broad.
- e. D. I, 7; dark brown, ventral surface lighter, everywhere with small lighter spots very closely crowded and scarcely evident on the dorsal surface; fins dusky, obscurely marbled; lat. l. 23; head 3. *hoplogerys* 3.
- ee. D. I, 8 or 9, rarely I, 7. Dark brown, sometimes everywhere with dark spots which occasionally have a white center; fins dusky, the base of the dorsal obscurely spotted like the body. *temminkii* 4.
- dd. Head as broad as long. *calamita* 5.
- bbb. Lower and upper caudal rays produced, the margin concave; 9-12 interopercular spines. D. I, 7, rarely I, 8 in *cirrhosus*; a dark spot on base of first dorsal membrane.
- f. Dark brown, everywhere with rather large, light spots; dorsal dark brown with wavy, interrupted horizontal bands; other fins spotted with lighter. Head $2\frac{1}{4}$ -3. *cirrhosus* 6.
- ff. Dark brown, back with two darker cross-bands; head irregularly marbled. *cirrhosus dubius* 6a.
- fff. Light or dark brown, everywhere covered with white dots which are largest on the belly; fins colored like the body. *leucostictus* 7.

117. **Ancistrus stigmaticus** sp. nov.
Types, No. 8022; one specimen, ♂ .11 m. Sao Matheos. Hartt & Copeland.
No. —, one specimen, ♂ .19 m. Goyaz. Senhor Honorio.
118. **Ancistrus hoplogenyis** (Günther).
Locality: Tajapuru.
119. **Ancistrus temminkii** (Cuv. & Val.).
A. dolichopterus Kner.
Localities: Cudajas; Gurupa; Lake Hyannary; Teffé; Iça; Jutahy;
Sarpa; Rio Madeira; Uerauduba; Tabatinga; Rio Trombetas.
120. **Ancistrus calamitus** (Günther).
121. **Ancistrus cirrhosus** (Valenciennes).
Localities: Cudajas; Obidos.
- 121a. **Ancistrus cirrhosus dubius** var. nov.
Type, No. 7983; one specimen, ♀ .13 m. Gurupa. Prof. Agassiz.
No. 7983; five specimens, ♀ .06-.10 m. Tabatinga. Bourget.
No. 7984; five specimens, ♂ & ♀ .07-.13m. Tabatinga. Bourget.
122. **Ancistrus leucostictus** (Günther).
Chaetostomus alga Cope.
Localities: Coary; Tabatinga; Jutahy.

BUNOCEPHALIDÆ.

I. BUNOCEPHALICHTHYS Bleeker.

1. **Bunocephalichthys hypsiurus** (Kner).

II. BUNOCEPHALUS Kner.

2. **Bunocephalus knerii** Steindachner.
Localities: Cudajas; Tabatinga; Hyavary.
3. **Bunocephalus aleuropsis** Cope.
4. **Bunocephalus melas** Cope.
5. **Bunocephalus bicolor** Steindachner.
Localities: Cudajas; Jutahy.
6. **Bunocephalus gronovii** Bleeker.
7. **Bunocephalus verrucosus** (Bloch).
Locality: Sarpa.

8. *Bunocephalus scabriceps* sp. nov.

Types, No. 7967; two specimens .04-.043 m. Jutahy. James, Thayer & Talisman.

This species may readily be recognized by its prominent cephalic knobs.

Tail slender, tapering. Head and body deep, the depth at base of occipital process scarcely less than the distance from tip of snout to base of pectoral. Nuchal plate a thin crest with two high knobs and a knob at its base; a transverse crest at base of nuchal plate directed backward externally; a low crest between the eyes, two crests extending backward from eyes, becoming approximated behind and forming a lyre-shaped figure; each arm of the lyre with three knobs: a crest extending forward from the eye, meeting its fellow at the tip of the snout.

Interorbital width equals the snout plus the eye; eye almost lateral.

Maxillary barbels reaching about to base of pectoral fins; mental barbels not reaching post mentals; post mentals less than interorbital width.

Teeth villiform in two narrow patches in each jaw.

Coracoid process converging backward, the margins of the coracoid bone marked by prominent ridges, which with the processes form a lyriiform figure; the length of the processes about equal to the space between them. Humeral process extending to about the middle of the pectoral spine.

Pectoral pore large, slit-like. Skin everywhere covered with small warts.

Distance of dorsal fin from tip of snout $2\frac{1}{2}$ in the length. Pectoral spine reaching tip of coracoid process, both margins with strong hooks, strongest toward tip.

Back mottled with light and dark brown; belly more uniform brown, marked with lighter.

A. 6: Greatest width in front of the pectoral fin 3 in the length.

III. DYSICHTHYS Cope.

- 9.
- Dysichthys coracoides*
- Cope.

IV. PLATYSTACUS Bloch.

Aspredo Linnæus; *Cotylephorus* Swainson; *Aspredinichthys* Bleeker.

10. *Platystacus cotylephorus* Bloch.
Silurus hexadactylus Lacépède; *Aspredo sex-cirrhis* Cuv. & Val.;
Aspredo spectrum Gronow.
 Localities: Vigia; Pará; Tajapurú.
11. *Platystacus nematophorus* Bleeker.
Aspredo nematophorus Günther.
12. *Platystacus aspredo* (Linn).
Platystacus levis Bloch; *Aspredo batrachus* (Linnæus).
 Localities: Pará; Arary.
13. *Platystacus sicuephorus* (Cuv. & Val.)
14. *Platystacus filamentosus* (Cuv. & Val.)
15. *Platystacus tibicen* (Temminck).
 Locality: Curuca, Rio Muria.

PYGIDIDÆ. *

I. NEMATOGENYS Girard.

1. *Nematogenys inermis* (Guichenot).
N. nigricans & pallidus Philippi.
 Localities: Curico; Santiago.

II. PARIOLIUS Cope.

- 2.
- Pariolius armillatus*
- Cope.

III. PYGIDIUM Meyen.

Trichomycterus Val.; *Thrycomycterus* Cuv. & Val.; *Thricomycterus* Girard.

* The genus *Cetopsis*, placed in the *Doradinae*, belongs here. It possesses the peculiar modifications of the anterior vertebrae characterizing this family.

DOUBTFUL OR INSUFFICIENTLY CHARACTERIZED SPECIES OF
PYGIDIUM.

I. *Pygidium fuscum* Meyen; II, III and IV. *Trichomycterus tigrinum*, *pallens* & *marmoratus* Philippi; V & VI. *Trichomycterus tenuis* and *corduvensis* Weyenbergh.

3. *Pygidium macraei* (Girard).

Locality: Uspullatuo.

4. *Pygidium maculatum* (Cuv. & Val.)

Locality: Rio Mapocho, Chile.

5. *Pygidium areolatum* (Cuv. & Val.)

Locality: Rio Mapocho, Chile.

6. *Pygidium rivulatum* (Cuv. & Val.)

Trichomycterus inca, *gracilis*, and *barbatula* Cuv. & Val.; *Trichomycterus pictus* and *pentlandi* Castelnau; *Trichomycterus dispar* Günther.

Localities: Cuzco; Moho & Puno on Lake Titicaca.

7. *Pygidium poeyanum* Cope.8. *Pygidium brasiliensis* (Reinhardt).

! *Trichomycterus brasiliensis tristis* Lütken.

Localities: Rio Parahyba; Mendez; Lagoa Santa; Santa Cruz.

9. *Pygidium taenia* (Kner).10. *Pygidium laticeps* (Kner).11. *Pygidium oroyæ* sp. nov.

Types, No. 3955; eight specimens .115-.14 m. Pochachara, Oroya River. Closely allied to *P. brasiliensis*.

Rather robust; head about as long as wide, none of the barbels reaching gill-opening when laid straight back. Gill membrane narrowly joined to the isthmus, without a free margin.

Pectoral short, fan-shaped, the first ray not prolonged. Dorsal inserted over the vent, its last ray over or behind the middle of the anal; its origin equidistant from anterior margin of eye or occiput and tip of caudal.

Caudal broadly rounded, its distance from the anal 4-4½ in the length.

Origin of ventrals about equidistant from tip of caudal and tip of snout.

Dark chocolate brown; sides, back and unpaired fins with irregular groups of dark points.

Head $5\frac{3}{4}$ -6; depth $5\frac{3}{4}$ -7; D. 12; A. 10.

12. *Pygidium punctatissimum* Castelnau.

13. *Pygidium knerii* Steindachner.

Locality: Cumbaca.

14. *Pygidium dispar* Tschudi.

Locality: Callao, Peru.

14a. *Pygidium dispar punctulatum* Cuv. & Val.

Locality: Rio Remac near Lima.

15. *Pygidium pardum* Cope.

16. *Pygidium nigromaculatum* Boulenger.

17. *Pygidium immaculatum* sp. nov.

Types, No. 8300; 10 specimens .12-.20 m. Juiz de Fora, Rio Parahybuna. Hallfeld.

8302; 1 specimen .15 m. Sao Matheos; Hartt & Copeland.

8307; 1 specimen .14 m. Juiz de Fora, Rio Parahyba.

8305; 1 specimen .14 m. Juiz de Fora, Rio Parahyba.

8266; 1 specimen .06 m. Goyaz. Senhor Honorio.

Elongate, compressed backward; head greatly depressed, the snout broad spatulate; width of head less than its length. Eye comparatively large, equidistant from tip of snout and tip of opercle. Barbels all rather short, the nasals scarcely reaching occiput, mostly shorter; maxillaries not to gill-opening. First pectoral ray prolonged in a filament. Dorsal truncate, its last ray in front of the anal, its origin equidistant from nares and tip of caudal or slightly nearer tip of caudal. Caudal broad, emarginate, the upper lobe sometimes produced.

Brownish, lighter below; fins somewhat dusky; specimens from Sao Matheos uniform blackish-brown.

Head $5\frac{1}{3}$ - $5\frac{1}{2}$ (6- $6\frac{1}{2}$ in total). D. 11; A. 9.

18. *Pygidium taczanowskii* (Steindachner).

19. *Pygidium nigricans* (Cuv. & Val.)

20. *Pygidium amazonicum* (Steindachner).

IV. EREMOPHILUS Humboldt.

Thricomycterus Humboldt; *Trachypoma* Giebel.

21. *Eremophilus mutisii* Humboldt.

Trachypoma marmoratum Giebel.

V. TRIDENS gen. nov.

Type, *Tridens melanops* sp. nov.

Ventrals small, nearer tip of snout than to base of caudal. Anal long, inserted in front of the dorsal fin. Head greatly depressed, the eye infringing on its lower and upper surfaces. A series of fine labial teeth; stronger teeth on the jaws. Gill membrane united, forming a broad free fold across the isthmus. Opercle and preopercle armed. Maxillary barbels 2.

22. *Tridens melanops* sp. nov.

Types, No. 8137; twenty-seven specimens, the largest .027 m. long. Iça. James.

Body compressed, extremely slender. Head broad, the snout rounded; mouth broad, inferior. Opercle long and slender, terminating in three spines, trident shaped. Preopercle with similar but smaller spines. Barbels minute, scarcely evident.

Distance of origin of dorsal fin from extremity of caudal 3 in the length; origin of anal fin from extremity of caudal $2\frac{1}{2}$ in the length. Anal rays rapidly decreasing in height backward, its last ray about over the last ray of the dorsal. Caudal rounded, without accessory rays.

Yellowish, a series of black spots along the base of the anal; posterior half of the caudal fin dusky.

Head 9; depth 13; D. 10-12; A. 20-25.

23. *Tridens brevis* sp. nov.

Type, No. 8160; one specimen .021 m. Tabatinga. Bourget.

Body short and deep. Head as broad as long. Mouth broad, inferior. Opercle with a bunch of six or more spines. Barbels well developed, the outer one extending to the base of the pectoral, the inner to the gill-opening. Eye large, nearer end of opercle than tip of snout.

Distance of dorsal fin from tip of caudal little more than 2 in the length.

Anal inserted very little in front of the dorsal and extending some distance beyond it, its rays decreasing in height toward the caudal. First pectoral ray greatly produced. Caudal emarginate.

Yellowish; blackish dots along the bases of the fins; a series of blackish dots along the middle line of the sides, similar spots on the back. Head with brown dots.

Head 6; depth 8; D. 9; A. 22.

VI. *PSEUDOSTEGOPHILUS* gen. nov.

Type, *Stegophilus nemurus* Günther.

Caudal widely forked. Mouth inferior, each jaw with series of fine teeth, upper lip with several series of fine movable teeth. No teeth on the vomer. Maxillary barbel single; gill membrane confluent with the skin of the isthmus. Opercle and preopercle armed.

24. *Pseudostegophilus nemurus* (Günther).

Locality: ? Morañon or Ucayale.

VII. *STEGOPHILUS* Reinhardt.**25. *Stegophilus maculatus* Steindachner.****26. *Stegophilus punctatus* Boulenger.****27. *Stegophilus intermedius* sp. nov.**

Type, No. 9842; one specimen .08 m. Goyaz. Senhor Honorio.

Elongate, compressed behind, depressed forward; head

somewhat longer than broad; snout pointed. Eye large, 1 in snout, $3\frac{1}{2}$ in head. Mouth large, upper lip with two series of teeth; intermaxillaries and mandible with four series of depressible teeth, those of the inner series enlarged at the tip. Lower lip not dilated, barbel shorter than the eye.

Opercle with two spines; preopercle with 5 or 6 claw-like spines.

Origin of dorsal about equidistant from tip of caudal and occiput; caudal emarginate; anal placed entirely behind the dorsal; origin of ventrals equidistant from bases of caudal and pectoral.

Light brown; entire upper surface with rather large dark brown spots; a series of larger dark spots along the middle line of the sides, the spots largest and most conspicuous on the tail; caudal with a few faint dark spots.

Head $5\frac{1}{2}$; D. 9; A. 7.

28. *Stegophilus macrops* Steindachner.

29. *Stegophilus insidiosus* Reinhardt.

30. *Stegophilus reinhardti* Steindachner.

VIII. VANDELLIA Cuv. & Val.

31. *Vandellia cirrhosa* Cuv. & Val.

Locality: Hyavary.

32. *Vandellia plazai* Castelnau.

Locality: Lake Hyannary.

IX. PAREIODON Kner.

Centrophorus Kner; *Astemomycterus* Guichenot.

33. *Pareiodon microps* Kner.

Astemomycterus pusillus Guichenot.

X. MIUROGLANIS gen. nov.

Type, *Miuroglanis platycephalus* sp. nov.

Gill membrane broadly united with the isthmus, without

a free margin. Maxillary barbels two; mouth inferior. Each jaw with several series of strong teeth. Opercle and preopercle with numerous strong spines. Caudal rounded.

34. *Miuroglanis platycephalus* sp. nov.

Type, No. 8172; one specimen .017 m. Jutahy. James, Thayer & Talisman.

Body short, compressed and rather deep. Head greatly depressed, wider than long. Eye large, lateral, placed behind the angle of the mouth.

Mouth sub-inferior, the upper jaw projecting slightly.

Upper maxillary barbel scarcely extending to the gill opening; no nasal or mental barbels.

Opercular and preopercular patches of spines united.

Origin of the dorsal little behind that of the anal; its distance from the tip of the snout somewhat less than twice its distance from the tip of the caudal.

Head $5\frac{1}{2}$; D. 10; A. 15.

SUMMARY.

	Species.	Varieties.
Siluridæ.....	232	13
Argiidæ.....	7	
Callichthyidæ.....	25	
Loricariidæ.....	150	3
Bunocephalidæ.....	15	
Pygididæ.....	34	1
Total.....	463	17

THE SMALL THRUSHES OF CALIFORNIA.

BY L. BELDING.

There has been much confusion concerning the small thrushes that occur in California, arising mainly, I believe, from the neglect of observers to verify their observations by securing specimens. Hoping to induce the ornithologists of California to give much closer attention to the four or more small thrushes that are found here, I have taken the liberty to present herein a portion of the data which came into my possession while superintending the collection of information concerning the migration and distribution of birds in the "Pacific District," and have quoted, sparingly, from several authors, such matter as I thought appropriate.

I am indebted to my young friend, Walter E. Bryant, for overseeing the publication of this paper. All measurements are in inches or parts thereof, and the nomenclature of the American Ornithologists' Union has been followed.

1. *Turdus ustulatus* (Nutt.)

RUSSET-BACKED THRUSH.—This is the one best known by our collectors, as it is less shy, and is perhaps the only one of these thrushes that breeds in the cultivated parts of the State, to which it appears to be mostly restricted. My observations at San Diego incline me to believe that it does not arrive in California from the south much before the first of May, although it is at least possible that individuals may arrive in the interior of the State from the Colorado and Mojave Deserts by way of the Tehachapi Pass and other interior routes much sooner than along the cool sea coast, as is undoubtedly the case with other species. It leaves central California about the first of September. Dr. Cooper (Proc. Nat. Mus., 1879, p. 249) says: "It left Haywards September 20, 1875." It has been collected as far south as

Central America in winter, as far north as Alaska in summer. It appears to be very rare east of the Sierra Nevada Mountains. It winters entirely south of California, although neither Xantus nor myself found it in the Cape St. Lucas region. Colonel Grayson found it abundant on Tres Marias Islands, in January. Mr. E. W. Nelson (Report upon the Natural History Collections made in Alaska, 1877-1881, p. 217) says: "At present it is known only from the southeastern coast portion of Alaska." Mr. John Fannin, of Burrard's Inlet, British Columbia, says: "It is an abundant summer resident." Dr. J. G. Cooper (Nat. Hist. Wash. Ter., 1860, p. 256) says: "This is one of the most common summer residents in the wooded parts of the Territory, arriving in May, and remaining until the beginning of September." Dr. Suckley, in the same volume, says it was "Quite abundant west of the Cascade Mountains." Prof. O. B. Johnson (Am. Nat., July, 1880, p. 486) says it is "Very common during the breeding season" in the Willamette Valley, Oregon. The only record of its occurrence east of the Sierra Nevada Mountains, as far as I can learn, is Mr. Ridgway's record in his report on the Ornithology of the Fortieth Parallel, p. 396, he having collected a specimen in the Truckee Meadows near the eastern base of the Sierra Nevada. Probably few breed as far south as northern Lower California, although the species was very common between Campo and San Diego, May 16, 1884, and quite as common south of Campo, in the mountains, to near Hansen's, as late as May 14 of the same year. I saw but few between San Diego and San Pedro Mountain, near the Gulf of California, in May, 1885. I first saw the species at San Diego in the spring of 1885, on May 3, when I shot both sexes in pepper trees, *Schinus Molle*, in the streets.

The following are mostly from migration notes of 1884 and 1885:

San Diego. April 25, 1862, April 20, 1875, arrived. Dr. J. G. Cooper, Proc. Nat. Mus., 1879, p. 245.

Poway, San Diego County. May 1, 1885, first seen, one individual; May 2, two seen; is common and breeds here. F. E. Blaisdell.

Foot of Volcan Mountains. April 2, 1884, two seen. W. O. Emerson.

San Bernardino. A somewhat common summer resident of the valley. F. Stephens.

Santa Cruz. Common; nesting about May 15; eggs from three to four, the latter number the most I have found in any one of about one hundred and fifty nests. Joseph Skirm.

San Jose. April 25, 1884, four seen for the first time. A. L. Parkhurst.

Haywards. April 12, 1885, first seen; common April 18. W. O. Emerson.

Berkeley. First seen April 23, 1885, one bird; next seen April 25; common on April 27; began to sing May 2; breeds here. T. S. Palmer.

Olema. May 7, 1884, first seen. A. M. Ingersoll.

Nicasio. April 23, first seen. Chas. A. Allen.

Chico. May 7, 1884, first seen. May 1, 1885, first seen; became common from the first to the sixth of this month. William Proud.

Sebastopol. April 27, 1885, first seen; next seen April 29; common April 30; breeds here. F. H. Holmes.

Fort Klamath, Oregon. Dr. J. C. Merrill, Auk, October, 1888, p. 365, says: "It arrived at Fort Klamath, Oregon, about May 20, a few nesting about the Fort and in suitable situations in the mountains near the Fort."

Fort Walla Walla, W. T. May 20, 1885, first seen, four birds; next seen June 2; by June 10 it was common. It is somewhat common here in breeding time. Dr. J. W. Williams, U. S. A.

Mr. Nelson, in Proc. Boston Soc. of Nat. Hist., Vol. XVII, p. 355, mentions having seen it at or near Nevada City, Cal., as late as November—an error, I am sure, the November birds having been probably the dwarf thrush, which I think

is the only form of the small thrushes that is found in central California as late as November.

The eggs of *T. ustulatus* are pale bluish-green, and always spotted, I believe, in this latter feature differing from the eggs of *T. aonalaschke* and *T. a. auduboni*. The song of *T. ustulatus* was well described by Nuttall as resembling "wit-wit, t'villia-t'villia". Prof. O. B. Johnson, in "Birds of the Willamette Valley," published in the American Naturalist, July, 1880, p. 486, says: "The alarm note is a short whistle 'whoet,' identical with that of a person attracting the attention of a dog; the call-note is a tremulous 'whaat-r-r-r' in the same key as the alarm note, only ending in a trill." He describes the song as "A peculiar whistle, ascending a scale of four notes, and sounds like *holsey—govendy—govindy—goveendy*." Dr. Suckley says: "Its voice is a low, soft, sad, lonely whistle, generally confined to one note about three seconds in length," from which I infer that he did not hear the full song of *T. ustulatus*. Most authors describe its notes in such general, indefinite terms as to be useless for purposes of identification. The notes on this species, *T. swainsonii* and *T. "nanus"* in Ornithology of California are very misleading. (See Dr. Cooper's corrections in these Proceedings, Vol. 6, 1875, pp. 190-192.)

2. *Turdus ustulatus swainsonii* (Cab.)

OLIVE-BACKED THRUSH.—Habitat, Eastern North America and westward to the Upper Columbia River and East Humboldt Mountains, straggling to the Pacific Coast. Breeds mostly north of the United States. (Check List of the American Ornithologists' Union.)

In 1885 or 1886 I enquired of Prof. Ridgway if he knew that this thrush had been collected in California, to which he replied—"We have in the Smithsonian Collection but one specimen so labelled, and this I find, after a careful examination, is *T. ustulatus* in somewhat worn and faded plumage." In the summer of 1888 I collected three speci-

mens in the mountains of Calaveras County, and these were compared with skins of *T. u. swainsonii* in the Smithsonian, and identified as typical *T. u. swainsonii* by Dr. A. K. Fisher. Prof. Ridgway also thinks them *T. u. swainsonii*, and my specimens collected in Calaveras and Tuolumne Counties in May and June, 1889, fully confirm the opinions of these gentlemen, as I find no difference between them and types of *T. u. swainsonii* from the Atlantic Coast, which were kindly selected and sent me by Prof. Ridgway and Mr. Brewster. I have a specimen I shot in Sierra Valley, California, on the east slope of the Sierra, June 20, 1885, which I think belongs here. I think this form is common in the Sierra Nevada mountains of California in summer, as I have heard its song in Tuolumne, Calaveras, Placer, Butte and Sierra Counties—a song which resembles the song of *T. ustulatus*, but lacks its power, sweetness, and ringing tones. The call and alarm notes of both forms are, however, almost identical.

The note of alarm of the California *T. u. swainsonii* is a short, soft, musical whistle, which may be represented by the word “*whoet*.” The call is also a whistling note, higher than the note of alarm, lasts two or three seconds and is suggestive of the peep of our small frog *Hyla regilla*. It has an enquiring expression. I think it louder than the call of *T. ustulatus*.

Examples of songs of Swainson's Thrush, which I copied as uttered in Calaveras County, California:



All of the notes excepting the one or two introductory ones of the songs are confluent or slurred.

Those I collected in Calaveras County, at altitudes varying from four thousand to five thousand feet, were in dense, damp forests, but I have also found colonies in willow thickets in grassy mountain meadows as at Bear Valley near Emigrant Gap and Sierra Valley, at both of which places I got poor specimens.

According to Mr. John Fannin, of Burrard's Inlet, B. C., it is an abundant summer resident of that region, arriving May 1, 1884, and May 12, 1885, but was not common in the latter year until May 27. Mr. Nelson (Report upon the Natural History Collections made in Alaska, p. 218,) says: "It breeds on the Upper Yukon River." Prof. Ridgway says, in his report on the Ornithology of the Fortieth Parallel, p. 397, that not a single individual of the smaller thrushes was met with after leaving the Sierra Nevada until arriving at the East Humboldt Mountains, where the olive-backed thrush was encountered in considerable numbers during the season of their southward migration.

According to Baird, Brewer and Ridgway, the eggs exhibit noticeable variations in size, shape, and shades of coloring, bearing some resemblance to those of *T. ustulatus*. Mr. Nelson says the eggs of *T. u. swainsonii* and *T. aliciae* are absolutely indistinguishable, both in shape and size, as also are the nests, according to his observations—and that both breed together on the Yukon River in Alaska, *T. aliciae* being the more numerous on the Lower Yukon. As the mouth of the Yukon River is nearly as far west of San Francisco as San Francisco is west of New York, it seems strange that the individuals of *T. aliciae* which spend the summer in Alaska do not follow the Pacific Coast in their southern migrations and pass through California. This remark will apply to other land birds which spend the summer in Alaska and other parts of the northwest coast and winter entirely in the Tropics. The physical features of the coast probably determine the line of flight.

3. *Turdus aonalaschkei* Gmel.

DWARF HERMIT THURSH.—Habitat, Pacific coast region, from Alaska to Lower California, east, during migrations, to Nevada and Arizona. Breeds from California northward. (A. O. U.)

It is common in winter in this State below the snow belt and I have seen it as high as Big Trees in January, nearly five thousand feet above sea level. It is common in the mountains of southern Lower California in winter. According to Mr. Nelson (Report upon the Natural History Collections made in Alaska, 1887,) there are no records of its occurrence in Alaska much north of Sitka, where it appears to be confined to the mild climate of the timbered coast. Mr. Fannin, of Burrard's Inlet, says: "It is a rare summer resident." It may breed in California, but I doubt if there is any proof that it does so, although I thought differently until recently. I supposed I had found it breeding in Calaveras County, but a careful examination of several skins I collected there in summer, satisfies me that they are the Big Tree thrush, as explained elsewhere in this paper. Captain Bendire found a nest at Camp Harney, Southeastern Oregon, June 28. It was on the ground and contained three young and an addled egg, the latter pale green in color, probably paler than usual. Unfertilized eggs are often paler and smaller than the average. Dr. Heermann, in Pacific Railroad Reports, Vol. X, refers to the breeding of this species in the sandhills about San Francisco, but does not mention *T. ustulatus*, although he collected about three years in this State. The species I saw at Stockton, June 8 (Proceedings National Museum, 1879), was, like Dr. Heermann's, probably *T. ustulatus*. On that day I found a colony of small thrushes in a large willow thicket along the Calaveras River, but could not get a specimen. I saw them in the middle of the day when they were not singing. Without specimens, observations on the small thrushes have but little or no value. Dr. J. G. Cooper (Proc. Cal. Acad. Sci., 1875,

p. 190) says: "The notes given by me in the lower five lines of this page (Ornith. Cal., p. 4) belong properly to the next species [*T. ustulatus*], as it is scarcely probable that any of this [species] remain in the lower country of California, or even in the mountains in summer, unless above an elevation of 8,000 feet, as does its Rocky Mountain representative, var. *auduboni* (Baird). The song of that, and of the eastern race, var. *pallasii* Cab., being described as resembling that of the wood thrush (*T. mustelinus*), with which I am familiar. I am sure that I never heard it in the Sierra Nevada up to 8,000 feet altitude, nor in the forests of Washington Territory, and that of var. *nanus* cannot be very different. It is the winter thrush of California, common from September to May." "I was misled in giving *T. nanus* as the common summer thrush of California, both by its having been given by all previous authors as the only small brown thrush found in the State (*ustulatus* being limited to the north)," etc. I have not seen the species at nor south of San Diego later than April 8; this was at San Diego in the very wet, backward spring of 1884. Mr. Blaisdell saw it at Poway as late as April 12, 1885. My latest Stockton record is April 25, 1879, when snow was low down in the mountains. Mr. Proud last saw it at Chico April 28, 1884. Dr. J. C. Merrill (Auk, Oct., 1888, p. 365), took a female at Fort Klamath April 29, but did not again see the species until May 11, when after a few days of cold weather it was abundant. Mr. A. W. Anthony first saw it in the spring of 1885, at Beaverton, Oregon, on April 18. Dr. Williams noted its arrival at Fort Walla Walla April 27, 1885, and that it was common by May 15. Young were seen June 30.

Observations bearing on its southward migration are the following: Mr. Henshaw (Report Wheeler's Survey, 1879), says: "By the last of August it was found numerous along the foothills of the Cascade Range of Oregon" (east slope). I have noticed its arrival at the summit of the Sierra Nevada, lat. 39° 20' N., September 22, in 1878, September 25, 1885, and have seen a few in the Sacra-

mento Valley, in about the same latitude, by October first, but the species is not usually numerous in the valley until about a month later. Mr. Henshaw (Report Wheeler's Survey, 1876), says none were seen on Mount Whitney until the last of September. The migration was at its height from the fifth to the fifteenth of October.

Mr. Blaisdell first noticed this species at Poway on October 25, 1885. Dr. Cooper (Proc. Nat. Mus., 1879, p. 245) first saw it on Santa Catalina Island, October 30, 1861. Perhaps I should give full credence to Mr. C. H. Townsend's Mt. Shasta record (Proc. Nat. Mus., 1887, p. 231), although he did not get the individual seen July 25, 1883. Mr. Brewster (Auk, Oct., 1888, p. 365) says Dr. Merrill's Fort Klamath specimens were "Quite as gray as in average Colorado specimens of *auduboni*." The wing of the female measured 3.23; those of the three males 3.50, 3.55, 3.55, being much smaller than my Calaveras County specimens of *T. sequoiensis*. I do not know that I have ever heard the song of the dwarf thrush. The name of the dwarf thrush, *nanus*, is very appropriate for this form. Mr. Nelson (Alaska Report, 1877-1881, p. 218) says: "Since the Unalaska thrush was described, not a single specimen of any species of *Hylocichla* has been found on this island by the various naturalists who have visited its shores, a fact of itself calculated to raise suspicion as to the correctness of the identification of Gmelin's name." Stability of ornithological nomenclature is very desirable, but if there is the least shadow of a doubt concerning the applicability of Gmelin's harsh *uconalascensis* to this thrush, the bird, the reader and writer should have the benefit of the doubt, and *nanus*, *guttatus*, *minor*, or almost any name should be substituted for it. Dr. Cooper recently wrote me: "I heard some years ago from Mr. W. A. Cooper that the dwarf thrush had been found breeding in the redwoods of Santa Cruz County. It may be your form or some other." Dr. Cooper thinks the Santa Cruz bird should be investigated, to which I cordially assent.

4. *Turdus aonalaschkæ auduboni* (Baird).

AUDUBON'S HERMIT THRUSH. — According to Ridgway's Manual of North American Birds, its habitat is the "Rocky Mountains, from northern borders of United States south to highlands of Mexico and Guatemala." Mr. Henshaw, in Report Wheeler's Survey, 1879, says: "During the past summer the important fact was ascertained that this form of the hermit thrush, instead of being strictly limited to the Rocky Mountains * * * * breeds along the eastern slope of the Sierras. During the summer of 1877, I heard in several of the sub-alpine valleys of Northeastern California, what were without doubt Audubon's thrushes, but failed to secure specimens. Here they were evidently not very numerous; but in the mountains back of Camp Bidwell the succeeding season, the same thrush was * * * * identified by shooting the bird. They were here very abundant, and at this date, July 19, the pine woods were filled by the sweet music of the males."

In 1884, Mr. F. Stephens informed me that it had been found breeding in the San Bernardino Mountains, but afterward said it might be the dwarf thrush, as he failed to get the parent of the eggs he found there—he had wounded and could not find her. He further said: "On looking over my skins, I find one which is Audubon's, that I shot near Campo, San Diego County, and one which is *very nearly intermediate between the dwarf thrush and Audubon's thrush.*" Col. N. S. Goss reported, for the Notes on Migration for the Pacific District, that he had found Audubon's thrush at Julian, San Diego County, altitude, 4,000 feet, on March 17, 1884. I made observations at Tehachapi Pass and in the adjacent mountains from March 27, 1889, to April 12, but was not able to find a single small thrush, which was the chief object of my visit, though I ascertained that many species enter the San Joaquin Valley from the Mojave Desert by that route, at an early date, without much regard to the temperature in the Pass, apparently knowing that a milder climate would soon be reached

5. *Turdus sequoiensis* Belding.

BIG TREE THRUSH.—I should have added to the description of this bird, published in these Proceedings, June 11, 1889, that its iris is bluish-brown, its mouth and most of the mandible are yellow, the tip of the latter brown.

The male shot by me June 10, 1888, at close range, as it crossed a path when pursued by a small owl, was badly mutilated. Its wing was 3.80; tail, 3.25; tarsus, 1.16. The female shot June 25, 1883, is very pale and seems to be in faded nesting plumage. The two type specimens are, I think, in the best spring plumage, as the largest ovaries of the female were no larger than No. 1 shot. The small spots on the throat and breast appear to be a constant feature of this form, which I am confident is entitled to recognition, but it may prove to be a southern variety of *T. aonalaschke*, just as *T. a. auduboni* may be a southern variety of *T. a. pallasii*, though this is at variance with the almost unvarying rule, that the more northern variety of a species is the larger; or it may intergrade with *T. a. auduboni*, which has been reported from the Sierra Nevada of California by three excellent observers, each of whom got, I believe, but a single specimen, and Mr. Henshaw's July specimen must have been too much faded for positive identification; and possibly all three were identical with the Big Tree thrush.

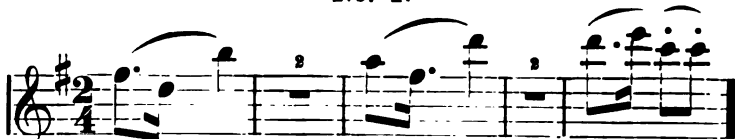
The latter inhabits dense thickets in deep forests and is apt to be overlooked. Sometimes it wanders at a considerable height through the foliage of the firs and other coniferous trees, when it is followed with much difficulty, even if its brilliant song is often heard. I shot the female type specimen while she was fluttering about seventy-five feet from the ground at the ends of fir twigs and catching insects in the manner of the warblers and tyrant flycatchers.

I spent most of July 4, 1881, in trying to find, with the assistance of a young hunting dog, the nest of a pair of these birds, which I had good reason to believe was in a certain hazel thicket. I failed to find the nest, probably

because I sought for it on the ground instead of in the shrubbery. Later I found the same pair, as I supposed, with their young within a few yards of this hazel thicket, shot one of the juveniles in spotted plumage and sent it to the Smithsonian Institute (No. 85,623 of that collection). I saw both parents frequently during the month of July and observed that they were gray or pallid. I was often within a few yards of them, but heard no complaint or note of any kind from them, nor am I certain that I have heard this thrush utter a call note. On a solitary occasion a male that was within a few yards of me expressed its displeasure at my presence and gaze by giving several squalls which resembled the complaining cries of *Pipilo chlorurus*, after which its two or more companions, that had been singing, were silent.

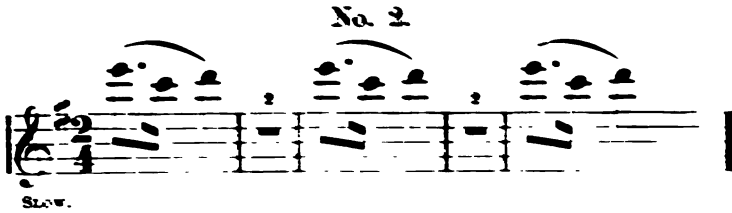
Its song was first heard in the spring of 1889, by J. Clarence Sperry, on May 12. The wonderful song of this bird I know to be much superior to the song of *T. mustelinus*, *T. fuscescens*, *T. ustulatus* and *T. u. swainsonii*. I never shot one of these sweet songsters without pangs of regret. While the songs of one individual may differ from those of another, the tone or voice of all is much alike and may be readily distinguished from those of *T. ustulatus* and *T. u. swainsonii*. The following examples, which I copied as they were uttered, will give some idea of its songs, though it is impossible to represent them in all their wild beauty on paper. Some songs had irregular intervals and could not be copied.

No. 1.



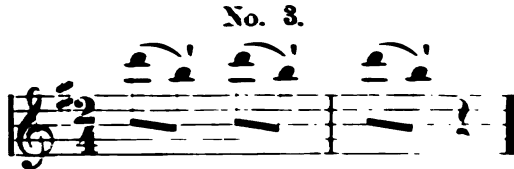
Slow.

In the third group of notes, the third and fourth notes are in reality but one connected note, the latter portion of which is, in a measure, an echo of the third.



In No. 2 the middle note has nearly the effect of an appoggiatura, the third note of the group being explosive and ringing. "Peek-a-boo!" nearly represents the accent and divisions of time of the usual song.

One individual had among its songs or groups of notes, No. 3, which it frequently uttered.



No. 4 was a powerful, ringing, wild burst of melody. One song began too high for the voice of the minstrel, causing it apparently a painful effort, which was not pleasing to the ear, but its other notes were of the usual delicate quality.

NOTES BY WALTER E. BRYANT.

Mr. Belding has asked me to append any notes I may have or obtain bearing upon the species treated in this paper, with which object in view I have written to several correspondents for items and visited the dense wooded region south of Monterey, in search of small thrushes. The results are here given.

Turdus ustulatus.—The records of arrival and time of nesting at Haywards, furnished from the note book of Mr. Emerson, are as follows:

Arrival.	First set of eggs.	Last set of eggs.
April 27, 1882.	May 16, 1880.	July 12, 1881.
April 2, 1883.	May 12, 1881.	July 3, 1882.
April 12, 1885.	May 14, 1882.	July 12, 1884.
April 9, 1886.	May 11, 1883.	
April 15, 1887.	May 13, 1884.	
April 18, 1889.	May 19, 1885.	
	May 11, 1889.	

The latest bird was seen on September 18, 1884.

Turdus aonalaschkei.—The arrivals of this species at Haywards, as noted by Mr. Emerson, are:

Dec. 18, 1880; none were seen in 1881; Nov. 28, 1882; Nov. 1, 1883; Dec. 25, 1884; Oct. 16, 1885; Dec. 20, 1886; Oct. 8, 1887. In 1885 they remained as late as March 28.

I have seen them at Healdsburg, Oct. 5, 1888, and am quite positive that I heard their single plaintive note among madrone trees at Healdsburg, August 7, of this year.

Dr. J. G. Cooper has written to me that in the "Additions and Corrections to History of North American Birds" (Vol. III, p. 499), the statement that he had sent skins of *T. nanus* (*T. aonalaschkei*) to the Smithsonian Institution is erroneous; he says: "I sent the birds as *ustulatus swainsonii*, and they were from Saticoy, not Santa Cruz, whence I sent nests and eggs as of *T. nanus* (Vol. III., p. 20). I further noted these points in Proc. Cal. Acad. Sci., Vol. VI, p. 190."

Turdus sequoiensis.—I have compared five examples (four males) of the thrushes taken in Monterey County, July, 1889, with the types of Mr. Belding's new *T. sequoiensis*, to which they are probably referable, although not typical. They were collected in heavily wooded, deep cañons, and were found by quietly tracing the bird's song or by calling them with a screaming sound made with the lips. The notes of the Monterey County birds were simply lonely, plaintive

calls, and although in the region for nearly a week I did not hear them actually sing.

In the same locality I frequently heard the full song of *T. ustulatus*.

Near Cañonville, Oregon, June 11, 1883, I shot a small thrush in worn plumage, which appears to be *T. sequoiensis* (No. 1008, coll. of W. E. B.); the label is marked "*nanus*." in the handwriting of an Eastern authority, the skin being one of a small collection, which I carried East the following year, and at that time such specimens were supposed to be faded examples of the dwarf hermit thrush.

Mr. W. W. Price has recently taken two birds in the San Bernardino Mountains, which are by no means typical of *T. sequoiensis*, and seem to be intermediate between *T. sequoiensis* and *T. aonalaschkæ*. In my opinion *T. sequoiensis* will be found to merge into *T. aonalaschkæ* when sufficient material is brought together, and consequently will stand as *Turdus aonalaschkæ sequoiensis* (Belding).

The Big Tree thrush appears to have no close relationship to *T. a. auduboni*, further than being one of the rufous tailed group, to which belong *T. aonalaschkæ*, *T. aonalaschkæ auduboni*, *T. aonalaschkæ pallasii* and *T. aonalaschkæ sequoiensis*.

Mr. R. C. McGregor has searched in the Santa Cruz Mountains for *T. a. sequoiensis* without success, but it undoubtedly occurs there and is the same that I collected in Monterey County and the one which Mr. W. A. Cooper reported as "Breeding in the redwoods of Santa Cruz County."

Mr. William Proud, of Chico, has looked for the Big Tree thrush near there, and in a letter to Mr. Belding writes: "I heard the song of a thrush decidedly different from *H. ustulata*;" the song "consisted of seven notes; the higher notes had a guttural sound, similar to some of those of *H. ustulata*."

In a letter dated August 4, 1889, Mr. Belding writes that he has "found a few of the Big Tree thrushes at the Sum-

mit [Placer County], and got a specimen July 22." The bird was a male, faded and worn; it measured, length, 7.40; extent, 12.10; wing, 3.80; tail, 3.10; tarsus, .15; bill from nostril, nearly .40. It was about fifty feet high in a leafless tree when shot. "This thrush," he further says, "is decidedly arboreal, quite as much as Townsend's Solitaire, and like it, goes from the ground well up into the large trees at a sharp angle."

Mr. Belding has sent me three young birds of *Turdus aonalaschkæ sequoiensis*, which he collected August 12 and 27 this year at Lake Tahoe, Cal. They are about full grown, and quite as dark as adults of *T. aonalaschkæ*. Dr. Cooper has hinted that *T. a. sequoiensis* may be but the summer plumage of *T. aonalaschkæ*, bleached out and otherwise changed in the dark but dry woods of the interior; but within a mile of the coast, in Monterey County, where dense fogs prevailed, I found this year birds that were unlike the winter plumage of *T. aonalaschkæ*, and referable only to *T. a. sequoiensis*, although not as pronounced as the type specimens.

Young. (No. 356, coll. of Cal. Acad. Sci., from Lake Tahoe, Cal., August 12, 1889. L. Belding). Above, olivaceous brown; each feather marked with a more or less distinct linear, obovate or guttate subterminal spot of light tawny buff. Rump and upper tail coverts, light ochraceous. Upper surface of tail, seal brown, uniformly lighter on under surface. Wings, clove brown, with lighter edging of outer webs. Band on under surface of wing, pinkish buff. Throat, sides of neck and jugulum, pale yellowish buff, distinctly darker on jugulum, the feathers marked with a terminal spot or edging of black, giving a heavily spotted appearance to the jugulum. Breast and abdomen, immaculate white, spotted on anterior portion and sides. Under tail coverts, cream color or nearly white. Wing, 91 mm.; tail feathers, 61.5 mm.; bill from nostril, 8 mm.; tarsus, 27.5 mm.

NEW BIRDS FROM LOWER CALIFORNIA, MEXICO.

BY ALFRED W. ANTHONY.

About one hundred and fifty miles south of the United States boundary, and midway between the Pacific Ocean and Gulf of California, lies a high range of mountains, which is marked upon the later maps of the peninsula as "San Pedro Martir." The region embraces a series of small ranges which rise from an elevated *mesa*, having a mean elevation of about 8,000 feet, and an extent of sixty by twenty miles. In these mountains are born the only streams that this part of the peninsula affords, and an abundance of pine timber is found throughout the region. Many of the ranges on the eastern side of the San Pedro Martir rise to an elevation of 11,000 feet, or even, in one or two places, to 12,500 (?) feet.

Arising as the region does from the dry, barren hills of the lower country to an elevation higher than any other on the peninsula or in Southern California, and presenting in its alpine vegetation and clear mountain streams features so different from the dry manzanita and sage-covered hills of the surrounding country, it is not unnatural to suppose that its animal life would be found to differ in some respects from that of the surrounding hills. It was not, however, until I had been in Lower California over two years that I was able to visit the locality and give it a little of the attention that it deserves.

During the latter part of April and the first of May of the present year (1889) my friend, Mr. Charles H. Townsend, and myself spent two weeks in exploring the higher ranges of this region, and although the results of our trip are very flattering, we were by no means able to complete the work. About one hundred birds were taken, yielding the following new forms, and others will perhaps prove entitled to separation when we have secured a larger series.

Oreortyx picta confinis subsp. nov.

SAN PEDRO PARTRIDGE.

Subsp. char.—Differing from *Oreortyx picta plumifera* in grayer upper parts and thicker bill.

Adult ♂. (Type, No. 2560, collection of A. W. Anthony from San Pedro Martir, Lower California, April 25, 1889, elevation, 8,500 feet.) Back, wings and tail, ashy brown with slight olive wash. Inner secondaries and tertiaries bordered with white, forming, when wings are closed, two parallel bars of white. Foreparts, above and below, slaty blue, slightly grayer above. Belly, rich chestnut, banded on the sides with bars of white and black. Flanks, rufous. Tibiæ, ashy. Crissum, velvety black streaked with chestnut. Throat, chestnut, bordered laterally with narrow black line, which in turn is bordered with white. A white mask surrounding the bill and changing to grayish on forehead. Arrow plumes, black.

Habitat.—Mountains of San Pedro range, Lower California, reaching to valleys in winter.

From an elevation of six thousand to ten thousand feet above the sea, in the San Pedro Mountains, I found this quail abundant, occurring wherever water and timber afforded it drink and shelter, and only leaving the higher elevations when the frosts of winter make life in the lower valleys desirable. A few pairs bred about my camp at Valldores, six miles from the base of the range and 2,500 feet above the sea; but nearly all of the flocks that wintered along the creek at this point were gone in March, leaving only an occasional pair, which sought the shelter of the manzanitas high up on the hill-sides, from whence their clear, mellow notes were heard morning and evening, so suggestive of cool brooks and rustling pines, but so out of place in the hot, barren hills of that region.

DIMENSIONS OF *OREORTYX PICTA CONFINIS*.

COLLECTION OF A. W. ANTHONY.

No.	Sex and Age.	Locality.	Date.	Wing.....	Tail.....	Exposed Culmen	Depth of Bill...	Tarsus.....	Remarks.....
				mm.	mm.	mm.	mm.	mm.	
2337	♂ ad.	Valladores.....	April 20, 1889.....	138	90	13	9	34	Type.
2360	♂ ad.	San Pedro Martir.....	April 25, 1889.....	139	93	14	9	35	
2338	♂ ad.	" "	May 7, 1889.....	141	98	14	9	35	
2362	♂ ad.	" "	May 6, 1889.....	110	83	14	10	35	
2361	♀ ad.	" "	May 6, 1889.....	111	93	14	10	35	
2339	♀ ad.	Valladores.....	March 29, 1889.....	133	77	14	10	34	

Aphelocoma californica obscura subsp. nov.

BELDING'S JAY.

Subsp. char.—Differing from *A. californica* in much darker colors and weaker feet.

Adult ♂. (Type, No. 2543, coll. of A. W. A., from Valladores, L. C., Sept. 8, 1888.) Above, indigo blue, darker on head. Dorsal patch, smoky drab. Auriculars, black, glossed with blue. Superciliary stripe, white. Gular streaks with blue wash. Lower parts, gray, much darker than true *A. californica*. Under tail coverts, bluish. Under surface of tail, smoky black with blue reflection.

Habitat.—Lower California in region of San Pedro range, ranging as high as 10,000 feet.

The great variation in size and color of the dorsal patch in the series from this region, suggests the presence of a second race, inhabiting the higher ranges, and characterized by small size and brownish dorsal patch, together with dark blue upper parts; the material at my command, however, does not warrant its separation. Specimens from the lower valleys agree in size with No. 2543, as given below:

DIMENSIONS OF *APHELOCOMA CALIFORNICA OBSCURA*.

COLLECTION OF A. W. ANTHONY.

No.	Sex and Age.	Locality.	Date.	Wing	Tail	Exposed Culmen	Tarsus,.....	Middle toe and claw.....	Remarks.....
				mm.	mm.	mm.	mm.	mm.	
2543	♂ ad.	Valladores	Sept. 8, 1888.....	127	165	26	37	28	Type.
2544	♂ ad.	San Pedro Martir...	May 6, 1889.	117	148	25	38	26	
2542	♀ ad.	" "	May 5, 1889.....	114	138	24	33	25	
2545	♀ ad.	" "	July 3, 1887.....	119	142	23	34	26	

Junco townsendi sp. nov.

TOWNSEND'S JUNCO.

Sp. char.—Similar to *J. annectens*, but differing in smaller size, darker gray of the head, neck and chest; the back less brown and the sides less extensively pinkish.

Adult ♂. Type, No. 2539, coll. of A. W. A., from San Pedro Mountain, L. C., April 28, 1889). Head, neck and breast all around, clear, slatey, gray, much darker than *J. annectens*, but paler than *J. hyemalis oregonus*. Lores and crown, blackish. Dorsal and interscapular region, ashy brown, in some specimens scarcely differing from the head and neck. Rump and upper tail coverts, ashy, first two lateral rectrices pure white, the rest blackish with ashy edges. Wings, blackish, primaries and secondaries with gray edges. Sides, pink. Belly and under tail coverts, white. Mandibles and feet, flesh color. Iris, hazle.

Adult ♀. (Type, No. 2538, coll. of A. W. A., from San Pedro Mountain, April 29, 1889). Head, neck and chest all around, uniform dark gray, lighter than male. Lores, blackish. Dorsal patch, very faintly defined. Rump, clear ashy. Pink of sides, paler and less extensive than male. Lower

parts white. Outer three rectrices white, third edged with dusky. Iris, hazle.

I take great pleasure in naming this excellent species for my friend, Mr. Chas. H. Townsend, of the U. S. S. *Albatross*, as a slight recognition of the much valuable work he has done for western ornithology.

J. townsendi is probably the most abundant bird to be found in the timbered parts of the San Pedro Mountain, and is, I think, resident, as I have never, with a single exception, taken the species at the base of the range. The characters described are remarkably constant. No. 2540, a fine adult male, sports the abnormal passerine number of thirteen rectrices, and has evidently lost a fourteenth. *J. h. oregonus* occurs along the base of the range in winter, but does not seem to join *J. townsendi* in nesting in the high altitudes.

DIMENSIONS OF *JUNCO TOWNSENDI*.

COLLECTION OF A. W. ANTHONY.

No.	Sex and Age.	Locality.	Date.	Wing.		Tail.		Exposed Culmen.		Tarsus.		Remarks.
				mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.	
2539	♂ ad.	San Pedro Mt	April 28, 1889	78	75	10	20					Type.
2540	♂ ad.	" "	April 28, 1889	78	76	10	20					
2537	♀ ad.	" "	April 29, 1889	72	67	10	20					
2538	♀ ad.	" "	April 28, 1889	73	73	10	20					Type.
2541	♀ ad (?)	Valladores	Dec. 8, 1888	70	72	10	21					

Sitta pygmaea leuconucha subsp. nov.

WHITE-NAPED NUTHATCH.

Subsp. char.—Differs from *S. pygmaea* in larger bill, grayer head, more conspicuous nuchal patch and whiter underparts.

Adult ♂. (Type, No. 2534, coll. of A. W. A., from San Pedro Mountain, Lower California, April 28, 1889). Whole top of head, ashy gray. Lores and line running through the eye and including upper auriculars, black. A large and conspicuous nuchal patch of white. Dorsal region, ashy-gray. Scapulars and rump, slatey-blue. Chin and throat, pure white; rest of lower parts, soiled white. Flanks, ashy. Wings, blackish. Second primaries slightly edged with white. Central tail feather like back, with long white spot at base, the others black, first pair with broad oblique white bar.

Habitat.—Higher parts of San Pedro Mountain, Lower California. A large series collected in April and May show a very constant variation from the specific form. They were very abundant throughout the pines and were evidently nesting; no nests, however, were taken.

DIMENSIONS OF *SITTA PYGMÆA LEUCONUCHA*.

COLLECTION OF A. W. ANTHONY.

No.	Sex and Age.	Locality.	Date.	Wing.....	Tail.....	Culmen.....	Tarsus.....	Depth of Bill at Nostrils.....	Remarks.....
				mm.	mm.	mm.	mm.	mm.	
2533	♂ ad.	San Pedro Mt.	April 28, 1889 ...	65	40	15	16	4	Type.
2534	♂ ad.	" "	April 28, 1889 ...	67	42	17	17	4	
2535	♂ ad.	" "	April 29, 1889 ...	70	40	15	16	4	
2536	♂ ad.	" "	April 25, 1889 ...	67	38	15	17	4	
2529	♂ ad.	" "	April 25, 1889 ...	69	42	16	16	4	
2524	♀ ad.	" "	April 28, 1889 ...	67	42	14	17	4	
2530	♀ ad.	" "	April 25, 1889 ...	66	41	15	17	4	
2531	♀ ad.	" "	April 25, 1889 ...	65	39	15	17	4	
2532	♀ ad.	" "	April 25, 1889 ...	66	40	15	16	4	

Sialia mexicana anabelæ subsp. nov.

ANABEL'S BLUEBIRD.

Subsp. char.—Differing from *S. mexicana* in slightly larger form, in the bay of the breast, which is divided by the blue of the throat, restricting it to patches on the sides of the breast, and in the almost entire absence of bay on scapulæ.

Adult ♂. (Type, No. 2548, coll. of A. W. A., from San Pedro Mountain, Lower California, April 28, 1889). Above, rich azure blue, a faint touch of chestnut on some of the scapular and dorsal feathers. Throat, neck and central breast, azure blue, extending to the middle of the belly, giving place to the bluish white of the lower belly and under tail coverts. A patch of chestnut on sides of breast extending half way down the sides.

Adult ♂. (Type, No. 2547, coll. of A. W. A., from San Pedro Mountain, May 1, 1889). Head and neck above, pale blue with pearly reflections. Dorsal patch, pale rusty brown. Rump, pale azure blue. Breast and sides, rusty brown. Throat, sides of head and belly, gray. Crissum with blue wash.

Differs from the females of *S. mexicana* in my collection in the more pronounced blue of the head and larger size.

Habitat.—Mountains of Lower California, Mount Lassen, Cal., Puget Sound, Utah and Nevada.

Named for my wife, Anabel Anthony.

From the series of thirty adult birds before me I am able to find but three that can not be immediately referred to one race or the other; these are: No. 53319, coll. U. S. Nat. Museum, Carson City, Nevada; No. 82589, coll. Nat. Museum, Marin County, Cal.; and No. 821, coll. A. W. Anthony, Washington County, Oregon. These are all male birds and midway between the two forms, having the bay of the breast scarcely divided by the blue, and but little rusty coloring on the scapulæ. Three National Museum speci-

mens which I have examined, from "Mount Lassen, Cal.," "Genoa, Utah," and "Puget Sound;" are undoubtedly referable to *S. m. anabelæ*. These, Mr. Ridgway writes me, are the only ones in the National Museum collection that match my specimens from Lower California. During our stay of two weeks on the San Pedro Mountain, both *S. mexicana* and *S. m. anabelæ* were everywhere common; the latter, however, greatly outnumbering the specific form, and in a great measure flocking by itself. At a distance of one hundred yards it was quite easy to identify the two forms; and I do not think that either Mr. Townsend or myself were guilty of shooting a male bird the identity of which we were not sure of beforehand; the greater amount of blue in the plumage of the adult male giving it an appearance much darker than that presented by typical *S. mexicana*. Most of the *S. m. anabelæ* were paired and preparing to nest by May 1st; but I think *S. mexicana* were not yet nesting; they appeared to be birds that were still moving northward, and it is possible that later we would have found them all gone. It is my opinion that *S. m. anabelæ* will prove to be a southern form of *S. mexicana*, wandering occasionally as far north as Puget Sound. A recent trip into the mountains of the eastern part of San Diego County, Cal., failed to bring to light any other than the typical form of *S. mexicana*.

The following tables of measurements will show the relative size of the two forms, and a slight though constant variation will be noticed in favor of the San Pedro birds, which are slightly larger than any *S. mexicana* which I have examined:

DIMENSIONS OF *SIALIA MEXICANA ANABELLE*.

No.	Sex and Age.	Locality.	Date.	Wing	Tail	Exposed Culmen	Tarsus	Remarks.
				mm.	mm.	mm.	mm.	
2546*	♂ ad.	San Pedro Mt.	May 6, 1889	109	75	13	17	Type.
2548	♂ ad.	" "	April 28, 1889	110	73	12	20	
2549	♂ ad.	" "	May 1, 1889	109	71	12	19	
2550	♂ ad.	" "	May 6, 1889	108	73	12	20	
2551	♂ ad.	" "	May 6, 1889	110	74	13	18	
2552	♂ ad.	" "	April 28, 1889	110	73	12	19	
2553	♂ ad.	" "	April 29, 1889	109	73	12	20	
2554	♂ ad.	" "	April 29, 1889	108	72	12	22	
2555	♂ ad.	" "	April 25, 1889	109	74	12	20	
13287†	♂ ad.	Genoa, Utah	June 25, 1889	110	74	12	19	
99777*	♂ ad.	Mt. Lassen, Cal.	July 4, 1884	110	71	11	21	
			Average	109.3	73	12.1	19.5	
2547	♀ ad.	San Pedro Mt.	May 1, 1889	106	67	12	19	Type.
2556	♀ ad.	" "	April 28, 1889	103	73	12	21	

* From No. 2546 to No. 2556, Coll. of A. W. ANTHONY. † U. S. Nat. Mus.

DIMENSIONS OF *SIALIA MEXICANA*.

No.	Sex and Age.	Locality.	Date.	Wing	Tail	Exposed Culmen	Tarsus.
				mm.	mm.	mm.	mm.
33*	♂ ad.	Riverside, Cal.	Nov. 24, 1887	106	70	11	21
672*	♂ ad.	San Bernadino Mts., Cal.	June 25, 1889	107	71	11	22
1160*	♂ ad.	Oakland, Cal.	Feb. 11, 1880	106	68	11	19
20293	♂ ad.	Paraiso, Cal.	April 17, 1885	102	70	12	19
8161	♂ ad.	Beaverton, Oregon	March 3, 1889	103	63	11	19
10553	♂ ad.	Beaverton, Oregon	Feb. 20, 1885	101	68	11	19
25251	♂ ad.	San Pedro Mt.	April 28, 1889	105	72	12	18
25261	♂ ad.	Valladores, L. C.	Dec. 4, 1888	106	71	12	19
			Average	104.5	69.1	11.5	19.5
8201	♀ ad.	Beaverton, Oregon	March 4, 1889	97	64	12	20

* Collection of W. W. PRICE. † Collection of D. S. BRYANT. ‡ Collection of W. E. BRYANT. § Collection of A. W. ANTHONY.

In conclusion I wish to thank my friend Mr. Chas. H. Townsend for much valuable assistance in collecting and preparing the material upon which these descriptions are based, and for his generosity in allowing me to describe the entire ornithological proceeds of our trip; also Messrs. Robert Ridgway, W. E. Bryant, and W. W. Price, for much valuable information, and the use of many specimens.

GENERAL ORNITHOLOGICAL NOTES. I.

EDITED BY WALTER E. BRYANT.

NESTING HABITS OF THE CALIFORNIA BROWN PELICAN.
(*Pelecanus californicus*.)

BY A. W. ANTHONY.

It is my impression that no description has been given of the eggs of this species since its separation from the Atlantic form; at any rate, papers that treat upon the subject are not so common as to make another superfluous and a few notes upon the habits of the pelican devoid of interest.

The largest colony that I have found thus far was discovered on San Martin Island April 12th, 1888. The island of San Martin lies about five miles off shore and nearly due west from San Quentin, Lower California, in about Lat. 30° 33' N. With the exception of a few acres of sand on the east and northeastern sides, it is composed entirely of lava, which has escaped from an extinct volcano on the southern end of the island; the greatest elevation is found at this point, which is perhaps 450 feet above the sea. The entire island comprises about 1200 acres. Three days were spent here in investigating the bird life, most of which time was expended in making life a burden to a colony of about five hundred pelicans, which were found nesting on the north end of the island. The nests were located in groups of twenty or thirty about a quarter of a mile from the beach and about 250 feet above the sea. They were largely composed of the accumulated filth of several generations of pelicans, and many of the older ones had obtained a height of three feet, evidently having been added to from year to year. Most of the nests were built on the tops of low bushes, but many were resting on the bare ground or placed

upon blocks of lava. Sticks, twigs, kelp, sea grass, and in a few cases bones of defunct sea birds, were used as building material, and a little sea grass spread over the top as a lining, no attempt being made to form anything more than a mere platform eighteen inches or two feet in diameter, and in nests of a single year's growth four or five inches in depth. At this date, April 12th, most of the nests contained young ranging from those just hatched to the full-fledged birds capable of flying.

Many nests, however, contained eggs, and by careful selection about twenty sets were found that were fresh, or nearly so; others taken at random proved to be all more or less incubated. The usual set seems to be three; a few nests contained two and were probably not complete; while but one set of four was found. The fresh eggs were perfectly white, but as incubation began they became stained from the damp, decaying seaweed and kelp, which forms the lining of the nest, and by the time they had been in the nest two weeks it was difficult to tell what the original color had been. An oölogist (?) whom I presented with a set of three stained eggs reported that he had cleaned them so thoroughly that they were much finer specimens than any of my fresh ones. When asked to describe the method used he informed me that he simply rubbed them with sandpaper until the shell was as thin as he considered safe. This method may be of value, but will hardly come into general use. A set taken at random from the collection of twenty-five, and which is perhaps a fair average as to size, measures in millimeters 83 x 48; 85 x 48; 72 x 50.

The birds at this colony did not appear to be very wild, only flying up when we had approached to within fifty or sixty yards and settling down again as soon as we had passed by. Flocks of from five or six to twenty were constantly arriving from far out at sea, flying in one long line, each following directly in the track of the one next in front, and but just keeping above the water until within a few hundred

yards of the island, when they rose gradually to the elevation of their nests. Towards night the flocks grew larger, as the birds that had been over to San Quentin Bay for the day's fishing began to arrive. These birds after fishing until sunset along the southern shore of the bay, gather in large flocks, and most of them fly directly up the bay, or almost at right angles with the course taken by those birds that fly directly towards the island. For some time I was at a loss to know where these flocks were going, as I knew that there was no resting place in that direction; but I found that after reaching the head of the bay, ten miles from the feeding grounds, they turned through a pass between the hills, and after flying five miles over land, reached the ocean at a point opposite the island, having flown eighteen or twenty miles to reach a point ten miles distant, rather than fly two miles over a range of hills one hundred feet high. Above ten per cent. of the birds, however, were wise enough to take the shorter route.

Hundreds of pounds of small fish were scattered all about the colony, in little bunches or singly, having been disgorged entirely undigested. I could not see that the young were making any use of these provisions, nor did any of the birds of the island except the gulls. They were probably designed, however, for the nearly fledged young that were still unable to fish for themselves.

One apparently fat and healthy adult female, which I saw frequently during my stay at the island, had splintered the upper mandible so that it hung down upon her breast in two or three long strips, waving and flapping as she flew like pieces of shingle; she had probably struck a hidden rock in diving for fish.

I did not find the pelican nesting on San Geronimo Island, fifty miles south of San Martin, but at Todos Santos Islands, opposite Ensenada, I am told that a few birds nest every year.

Mr. A. M. Ingersoll informs me that about twenty-five nests are to be found on one of the Coronados Islands.

OCCURRENCE OF *Phaethon aethereus* AND CAPTURE OF *Scolecophagus carolinus* IN LOWER CALIFORNIA.

BY A. W. ANTHONY.

Heretofore it has been considered rather unusual to encounter the tropic bird north of Cape St. Lucas, although it has been regularly met with in that latitude. I think, however, that it will be found to be a regular though perhaps a rare visitant to the entire Pacific coast of the Peninsula. In June, 1887, I saw tropic birds on two consecutive days at a point about fifty miles north of Cerros Island (Lat. 29° N.) I next observed them in September, 1888, while on my way from Ensenada to San Quentin. As we were passing Cape Colnett, somewhere in the Lat. of $31^{\circ} 15'$ N., a pair of tropic birds joined the ship and flew about with the gulls for some time; later in the same day a single bird was seen about twenty-five miles farther south. I am reasonably sure that I have seen one or two birds about the Todos Santos Islands, sixty miles south of San Diego.*

As no Pacific Coast record has been given of the appearance of the rusty blackbird south of Alaska, I was not a little surprised when I encountered the species at my camp at the foot of the San Pedro Martir range in Lower California, where a single male bird was taken December 12, 1888. No others were seen, nor was *S. cyanocephalus* found until some weeks later. Comparison of my specimen with winter birds from the Eastern States proves it to be typical *S. carolinus*. Nelson in his "Report upon the Natural History Collections made in Alaska, 1877-1881," reports *S. carolinus* from Sitka, which is, I think, the southernmost record heretofore.

* Dr. J. G. Cooper informs me that a skull of a tropic bird was found by Mr. Gruberon on the coast of Marin County about twenty years ago. W. E. B.

Puffinus griseus (Gmel.), *Puffinus gavia* (Forst.) AND *Stercorarius pomarinus* (Temm.) ON THE COAST OF CALIFORNIA.

BY W. E. BRYANT.

A specimen of *Puffinus griseus*, now in the collection of the California Academy of Sciences (No. 340) was washed ashore near San Francisco in 1887. This species has not been previously known from Pacific Ocean. Dr. Cooper mentions* a blackish species, found by him on the coast of California, and supposed to be the young of *P. creatopus*, with which it was associated. The bird in question has been identified by Mr. Ridgway.

The Black-vented Shearwater (*Puffinus gavia*) has been known from the Pacific Coast only from two specimens taken at Cape St. Lucas by Mr. John Xantus, and a single bird found by myself on Guadalupe Island, Lower California. Mr. R. C. McGregor found one dead upon the beach at Santa Cruz, Cal., Oct. 17, 1888, (No. 319, ♀, coll. R. C. McG.) It will probably be taken on the coast of California much farther north.

In the collection of the California Academy of Sciences is a specimen of the Pomarine Jaeger (*Stercorarius pomarinus*), No. 341, which was found on the ocean beach, San Francisco, after a heavy storm in 1887. The only notice I find of its occurrence on the Pacific Coast is of a single bird taken by Mr. Elliott on the Pribylof Group, Alaska.

NOTES ON THE OCCURRENCE OF *Fregata aquila*, *Clangula hyemalis* AND *Oceanodroma furcata* ON THE COAST OF NORTHERN CALIFORNIA.

BY T. S. PALMER.

During a short stay in Eureka, this spring, I had the pleasure of examining the collection of mounted birds belonging to Mr. Chas. Fiebig of that city. Mr. Fiebig has kindly furnished me with the data concerning the following species:

* Auk, Vol. III., p. 125.

Fregata aquila. Man-o'-War Bird.

A female of this species was shot by a market hunter on Humboldt Bay, Oct. 5, 1888, and presented to Mr. Fiebig, who now has it in his collection. This is believed to be the first well authenticated record of this bird on the coast of California. Its claim to a place in the avifauna of this State having heretofore rested on a skull, supposed to be of this species, found on the Farallon Islands a number of years ago.*

Clangula hyemalis. Old-squaw.

A rare species on this coast, especially in California. A male was taken on Humboldt Bay, Oct. (15?), 1888.

Oceanodroma furcata. Fork-tailed Petrel.

A specimen was picked up on the beach of Humboldt Bay, by Mr. J. B. Brown, on February 16 or 17, 1887. It was one of a number which had been killed by a recent storm and washed up on the beach.

The fork-tailed petrel has been taken within the State on one or two occasions before, but the instance cited above seems to show that it is common, if not abundant, off our coast in winter, and like the Pacific fulmar, is sometimes destroyed in considerable numbers by severe storms.

THE IDENTIFICATION OF CALIFORNIAN NESTS AND EGGS OF
THE GENUS *Empidonax*.

BY H. R. TAYLOR.

It is, I think, a fact of interest and one not before remarked, that of the four species of *Empidonax* found breeding in California, the eggs of two of them, *E. difficilis* and *E. pusillus*, which are spotted and indistinguishable, may be identified by the great difference in construction and especially position of nests.

Three nests of *E. pusillus*, found by me this year near Pleasanton, are much deeper and more compact than any of

* Proc. Cal. Acad. Sci., Ser. 2, Vol. 1, p. 41.

the many nests I have seen of *E. difficilis*. They were built in the forked branches of small trees, which is the invariable rule, while the nests of *E. difficilis* are never found in such situations. Occasionally a nest of *E. difficilis* is seen in the top of a tree trunk, where large branches diverge, but it is noticed that in such cases they occupy a depression in the bark, never being supported by twigs at the sides like the nests of *E. pusillus*. Mr. L. Zellner, of Los Angeles, writes to me :

“I have collected seven or eight nests of this species [*E. pusillus*] this season, in the early part of June. They contained from three to four eggs each, and were all placed in the forks of willows from four to eight feet from the ground.”

The nests of *E. hammondi* and *E. obscurus* are said to be sometimes built in forks, but as their eggs are unmarked there is no danger of confounding them with the eggs of either *E. difficilis* or *E. pusillus*. Just how far it is possible to identify the eggs of *E. hammondi* and *E. obscurus* from the situation and construction of the nests and the size of the eggs, must be learned from a large number of instances obtained from different localities.

AN OMISSION FROM THE A. O. U. REVISED LIST.

BY W. W. PRICE.

In the “Auk” (Vol. V., p. 425) appeared a record of the capture of Xantus’s becard (*Platypsaris albiventris*) in the Huachuca Mountains, Southern Arizona, seven miles north of the Mexican boundary, which has been overlooked in the revision of the check list of North American birds.

A day or two after it was taken the bird was sent to Mr. Robert Ridgway for identification, and remained in the Smithsonian Institution several months. The record seems to be of some importance, as it is not only a species new to

the United States avifauna, but also a new genus and family within the United States.

A SPECIMEN OF *Passerella iliaca* TAKEN IN CALIFORNIA.

BY W. E. BRYANT.

Mr. A. M. Ingersoll, of San Diego, has sent to me for examination a male fox sparrow (*P. iliaca*), which he collected at Poway, San Diego County, January 3, 1888. The bird is in good plumage and not different from Eastern examples. In the appendix to Hist. of N. A. Birds, Vol. III, p. 516, mention is made of "The capture of a specimen exactly intermediate between *P. iliaca* and *P. townsendii*, at Saticoy, California, December 14, 1872, by Dr. Cooper."

ENTOMOLOGICAL CONTRIBUTIONS.

BY H. H. BEHR.

I.

THE GENUS NEOPHASIA Behr.

The late Baron Terloot de Popelaire, many years ago, while on a journey through the pine forest region of the Sierra Madre, from Durango to the Pacific Coast, collected a peculiar butterfly, and, having no better means of preserving it on a hurried trip through a region infested by Indians, pressed it in his pocket-book.

This specimen, considerably shattered, but showing all its essential characteristics, came into my hands. I saw it to be a near relation of *Pieris Menapia* Felder, and a close inspection of the nervation of its wings revealed the fact that the insect could not be comprised in the genus *Pieris*. A careful study of *Menapia*, which it so much resembled, made it evident that both species were congeneric, belonging to a new genus having characteristics of *Leptalis* and *Euterpe*, and even of the Asiatic genus *Pontia*, and the European *Leucophasia*. On this species, *Menapia*, and the new one which I called after its discoverer *Terlootii*, by misprint *Terlootii*, was founded the genus *Neophasia*.

Since that time various webs of very peculiar structure have reached me from different parts of Northern Mexico, with the statement that they were the work of caterpillars living in them through the rainy season, and producing a butterfly, not a moth, early in spring. These nests were only found at an elevation beyond permanent human habi-

tation, but there in great profusion on the Madroño, an *Arbutus*, probably identical with our *A. menziesii*.

As these webs can be made very useful for certain purposes, several members of the Academy tried to obtain living insects, which could be easily acclimatized in our madroño forests, or into plantations where it could be more easily protected. One result of these efforts was to prove that it was not quite as common in the fastnesses of the Mexican Sierras as it had appeared. The evergreen foliage seemed to preserve the webs for an indefinite time, and all our correspondents agreed that they were obliged to examine many of them before they found one inhabited.

The few which were sent always arrived with all their inhabitants dead, and so badly shattered that they could not be used as specimens for the entomological cabinet, but not so completely that it was impossible to classify them generically, and their nervation showed that they belonged to a third species of the genus *Neophasia*.

An invoice which I received from Cozihuiriachic, which probably came from some mountain ridge of that neighborhood, contained webs full of *Terloutii* developed in transit, and smothered by the close packing, proving that species had the same larval habit and food plant as the inhabitants of the former webs.

There were now, including *Menapia*, three species of the same type, two of them connected besides by their peculiar method of life in the larval state.

In Kirby's Catalogue of Diurnal Lepidoptera is found a genus *Eucheira* with a single species, *E. socialis*, described by Westwood in Trans. Entom. Soc. i, 44 (1836), and credited to Mexico. The volume of the Transactions is inaccessible to me, but the specific name *socialis* caused a vague suspicion that the genus was identical with *Neophasia*, a supposition which has been confirmed by an article from

Dr. Jesus Aleman in *La Naturaleza*, Vol. vii, where he describes *E. socialis* and discusses its uses, and adds a plate showing the butterfly in the act of laying eggs on an arbutus leaf, the caterpillar on a branch, and a colony of chrysalides in the peculiarly shaped web so characteristic of the species.

As there is not the slightest doubt that *Terloutii* and *Menapia* belong to the same genus as *socialis*, it naturally follows that the name *Neophasia* Behr, must be retired in favor of *Eucheira** Westw., which is the older and a most appropriate name, referring as it does to the workmanship of the larva, most unusual in the series of *Pierides*, and of the Diurnals in general. The genus *Eucheira*, comprising now three species, their diagnoses for greater distinctness may be formulated as follows:

1. *E. SOCIALIS* Westw. Alæ anticæ, macula alba discoidali signatæ, cunctæ fascia alba per mediam alam transversa, nec non punctis albis marginalibus instructæ.

2. *F. TERLOOTII* Behr. Alæ anticæ nigræ, fascia alba maculari marginem versus posteriorem usque ad basin alæ extensa, nec non punctis marginalibus instructæ. Alæ posticæ albæ concolores. Alæ subtus ut supra, posticæ versus marginem tantum linea fusca signatæ.

Sierra Madre, Mexico, in regione coniferarum.

3. *E. MENAPIA* Felder. Alæ candidæ, anticæ apice nigræ, fascia maculari vel maculis disruptis albis signatæ, nec non macula discoidali nigra per marginem anteriorem usque ad basin extensa. Alæ posticæ ♂ ris concolores, ♀ næ margine nigro fascia maculari alba signatæ. Alæ subtus ut supra sed utrisque sexus alæ posteriores linea fusca marginali interdum rubescente instructæ.

Sierra Nevada, California; Oregon; Vancouver Island.

* From $\epsilon\upsilon$, well, and $\chi\epsilon\iota\rho$, hand.

The larval state of *socialis* and *Terlootii* is entirely the same, but as to that of *Menapia* my information is very imperfect. It is always found in regions abounding in coniferous trees, and has been supposed to feed on them, but as Madroño is usually found in the same districts, it is possible that its food plant is the same as that of the other species, although *Arbutus* is as exceptional a food for *Pierids* as a conifer would be. The peculiar silky web made by the other species has never been observed in the range of *Menapia*, and as such a conspicuous object could hardly have escaped observation, the larvæ (still unknown) probably do not form them. It may be that it is a social weaver only in its earliest stages, as is the case with *Aporia crategi*, the food plant of which is also an anomaly in the series of the *Pierides*.

II.

A NEW CEROCAMPIDE.

By the kindness of Professor J. J. Rivers, of our State University, I received a caterpillar preserved in alcohol, and two living chrysalides, which in process of time furnished a pair of moths belonging to the series of the *Cerocampides*.

A very similar insect was described and figured in Smith Abbott's Insects of Georgia, under the name *Notodonta concinna*.

A close examination of Professor Rivers' specimens has convinced me that they cannot belong to the genus *Notodonta*, but that they are most related to *Dryocampa*. It may be that the species deserves generic rank, but I leave this question to other Entomologists, who have in a full series of this and related types better means for comparison.

DRYOCAMPA RIVERSII mihi. Imaginis statura *Notodontæ concinnæ* Smith. Thorax atropurpureus, abdomen et anterior et posterior pallidum, medium atropurpureum. Alæ anticæ griseæ, nervosæ, atomis longitudinaliter extensis ir-

regulariter perspersæ; umbra transversa medium alam percurrente; margine anteriori apicem versus duobus maculis signato. Margo posterior umbra purpurascente, in ♀ na magis diffusa, usque ad angulum posticum impletus; in ♂ re et ad mediam alam et prope angulum, in ♀ na prope angulum tantum macula dilutiori interrupta. Alæ posticæ ♂ ris albæ, ♀ næ obscuræ.

Napa Valley on *Juglans*.

The caterpillar rests with its anal joints lifted after the manner of *Notodonta Ziczuc* or rather *N. concinna*, so that the anal feet do not touch the leaf on which it rests, but it uses them, though they are less developed than the other prolegs and rather imperfect for locomotion, according to the observation of Professor Rivers. The skin is naked and furnished with horny but hairless tubercles, which increase in length towards the head and anal extremity, forming blunt spinose appendages; dorsal surface longitudinally striped with alternate black and white lines, the sides olive green with a few dispersed white spots, bordered by black lines; head and girdle of fleshy tubercles encircling the first pair of footless joints between the legs and prolegs, bright red. It is of course possible that the colors have been modified by the preservative alcohol.

This moth appears to form a transition from the *Cero-campides* to the *Notodontides*. It may possibly be considered a new genus in which *N. concinna* Smith, would be a second species. The slightly dentate outline of the external margin of the forewings distinguishes the insect from other species of *Dryocampa* and approaches it somewhat to the *Notodonta* group, but the nervation of the wings, and its larval characteristics, bring it without doubt into the former.

In markings it bears some resemblance to the European *Hybocampa Milhauseri*. It also shows a certain likeness in nervation and outline of wings, as well as in texture of

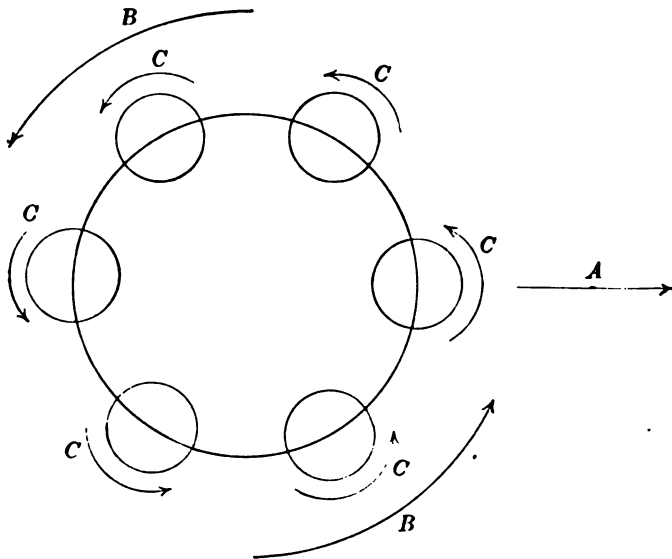
thorax and patagia, to the Australian *Danima Banksiæ*, but the entirely different sphingiform larva of the latter prove that this superficial similarity is rather of analogy than of affinity.

As well as we are able to judge from the material and literature at our command this is the only species thus far found in California, of the series of the *Cerocampides*, so well represented in the Atlantic States and in tropical America.

CYCLONIC WINDS.

BY P. S. BUCKMINSTER.

During the summer of 1878, at Belleville, Esmeralda Co., Nevada, I observed a movement in cyclonic winds, which I believe has not heretofore been recorded, and which is shown in the diagram.



A. General Movement. B. Large Circular Movement. C. Small Circular Movement.

Heretofore circular winds have been represented as having three movements, viz: of direct projection, of revolution, and a vertical movement. My observation was of a well-defined and strongly marked smaller circular movement, in and upon the line of the general circular movement, which was continuous and sustained during the whole time of observation. This movement was manifested by a

cylindrical film of sand having a diameter of approximately twenty feet, moving slowly upon its direct course and with a velocity of about ten feet per second around its central axis. In and upon this moving circle were six small revolving circles not exceeding one foot in diameter and having a greater velocity, probably inversely proportionate to their diameters. Their greater velocity enabled them to take up from the surface of the ground more sand and debris than the larger circle, and as a consequence, they maintained strong and independent columns upon the larger but weaker one.

The movement, which was from right to left in its circular projection, passed within a few rods of me. Approaching, it was upon ground having a loose sandy surface and free from obstructions. Near me the ground presented a few scattered shrubs with sand intervening; beyond, there was open sand again, then a street with a line of buildings upon one side; beyond the buildings were: first, sand, then sand and shrubs. The fourth movement was strongly defined when I first noticed the general movement, and so continued during the time I was able to observe it. When the movement reached the ground covered with shrubs and one of the smaller movements encountered them, it would apparently become obliterated, but directly it would appear in its place again, simply having been broken at its earth contact. The movement passed directly over the buildings noted and again made ground contact, maintaining its several movements, which were sustained while it was within my observation.

In the recorded observations of devastation effected by tornadoes, we find instanced the twisting of branches of trees about their trunks, the turning of chimneys upon their bases without being thrown down, the whirling of objects in the air, the erratic movement of bodies, etc., none of which are explainable by either or all of the movements heretofore recognized, but which are readily accounted for by this fourth movement.

This fourth movement existing in a tornado might not constantly manifest itself, for when obstructions are encountered, the general movements are disturbed, and the circular ones raised from earth contact. But when there are no serious obstructions the surface air is enabled to flow in freely and fully and produce a complete cylindrical movement, then, and following such an attained condition, should occur manifestations of this fourth movement.

A REVIEW OF THE ERYTHRININÆ.

BY CARL H. EIGENMANN AND ROSA S. EIGENMANN.

(With Plate I.)

The Erythrininæ is a sub-family of the Characinidæ. It has usually been separated from the remaining sub-families on account of the absence of an adipose fin. This absence of the adipose fin, when isolated from other characters, seems to us to be of little value in classification. The genera of this sub-family are more closely related to the Anostomatinæ than they are to the Curimatinæ, with which they have usually been associated.

The species of this sub-family are, with two exceptions, confined to the eastern slopes of South America and the adjacent islands.

The specimens examined belong to the Museum of Comparative Zoölogy at Cambridge, Mass.

ERYTHRININÆ.

Adipose fin none. Gill opening wide, the membranes slightly united, free from the isthmus. Nares approximated. Teeth well developed, at least in the jaws; pharyngeal teeth villiform. Cheeks covered by the suborbital bones. Brain case entirely enclosed above. Body elongate, slender, fusiform or sub-fusiform. Back not greatly arched, belly rounded. Dorsal short, of 8 to 15 rays. Intestines short. Carnivorous.

ANALYSIS OF THE GENERA.

- a. Dorsal in advance of the anal, usually over or little behind the ventrals.
 - A. 10-13.
 - b. Gape very wide, little oblique, maxillary reaching at least middle of orbit. Intermaxillaries and dentaries with strong canines; maxillary with fine pectinate teeth; palatines dentiferous. Caudal rounded; dorsal over ventrals. Lateral line developed.

c. Walls of the air bladder normal. Outer series of palatine teeth enlarged and removed from the villiform teeth; a detached patch of teeth in front of the palatines. Dentary with canines anteriorly and laterally. Maxillary with a canine anteriorly; all teeth pointed. Dentary process joined to the dentary at the symphysis, within the lateral canines and merging into the dentiferous ridge midway between symphysis and posterior angle of dentary; the pit formed behind the larger canine and the one behind the lateral canines filled with numerous short conical teeth which lie concealed in the muscles; a deep pit in the intermaxillary for the reception of the larger dentary canine. Snout pointed; maxillary and mandible extending beyond the orbit. Supratemporal plate single. D. 12-15; A. 11. Lat. l. 39-44 (fig. 1).

Macrodon 1.

cc. Walls of the anterior portion of the posterior air bladder cellular. Palatine teeth all villiform, in a single patch on the sides of the palate. Maxillary with pectinate teeth only, no canines. Dentary with short conical teeth; two canines near the symphysis the outer of which is the larger; no lateral canines. All the teeth blunt. Dentary process joined for its whole length to the dentiferous ridge. Intermaxillary without a pit. Snout decurved, rounded. Supratemporal plate double. D. 11-12; A. 11; Lat. l. about 33 (fig. 2).

Erythrinus 2.

bb. Gape oblique, not reaching beyond middle of orbit, usually shorter. Maxillary with a few slender teeth, no canines. Palate edentulous or slightly roughened in *Lebiasina*; caudal forked or emarginate. Lateral line obsolete or developed on a few scales only.

d. Walls of the air bladder normal. Teeth all conical; intermaxillary teeth in one or two series; dentary teeth in two series; maxillary teeth in a single series; mouth very oblique; maxillary not reaching orbit. Cypriniform. Species with a black spot on dorsal (fig. 3).

Pyrhulina 3.

dd. Walls of the anterior portion of the posterior air bladder cellular. Intermaxillary, maxillary and outer series of the dentary teeth tricuspid; dentary with an inner series of much finer conical teeth separated from the outer series by a deep groove; supratemporal plate double (fig. 5).

Lebiasina 4.

aa. Dorsal over the anal. A. 20-31; V. 6. Opercle terminating in a spine or filament. Teeth compressed, with multicuspid crowns, the median cusp longest, in two rows on intermaxillary, in a single row on mandible; palate toothless. Caudal deeply forked; lat. l. present. Body subfusiform, compressed. Mouth moderate, oblique.

Stevardia 5.

I. MACRODON.

Macrodon Müller '42a* 308 (*trahira*).

* See Bibliography at end of paper.

Type: *Macrodon trahira* Spix.

This genus is composed of two species inhabiting respectively the east and west slopes of South America. The head is more elongate, the snout more pointed and the dentition more formidable than in the other genera of the *Erythrininae*.

ANALYSIS OF THE SPECIES.

- a. Eleven series of scales across the back of the tail from one lateral line to the other. Lat. l. 43-44; D. 14; A. 11. Sides mottled with light and dark brown. *microlepis* 1.
 aa. Nine series of scales across the back of the tail from one lateral line to the other. Lat. l. 39-43; D. 12-15; A. 10-11. Sides plain or mottled; young usually with a dark lateral band. *malabaricus* 2.

1. *Macrodon microlepis*.

Macrodon microlepis Gthr. '64, 282 (Chagres River; Western Ecuador).

Macrodon trahira microlepis Steind. '80a, 49 (Guayaquil)).

Habitat: Western slopes of South America from Guayaquil to Panama.

Two specimens .05 and .365 m. from near Obispo and from the Rio Chagres near Gorgona. The smaller specimen is somewhat more slender and has an indistinct dusky area along the lateral line, the fins are higher and less profusely spotted; the pectoral is plain with an aggregation of dark dots at its base. There are thirteen series of scales across the back before the dorsal fin in both specimens.

The larger specimen has the vertical fins profusely spotted and barred, the bars on the caudal and anal leaving only narrow light bars of the ground color. Tongue with a few granular patches at its base.

2. *Macrodon malabaricus*.

Haimuri; Haimara; Huri; Canhui; Tari-ira; Trahira.

Tareira Marcgrave, 1648, 157.

Esox malabaricus Bloch. 1794, pt. 8, 149, pl. 392 (Tranquebar.)

Synodus malabaricus Bl. & Schn. 1801, "397."

Synodus tareira Bl. & Schn. 1801, "398, pl. 79."

Macrodon tareira C. & V. xix. '46, 508 (Bahia; San Francisco; Amazon; Maracaibo).

Erythrinus trahira Spix '29, pl. 18; Cast. '55, 56 (Bahia).

Macrodon trahira M. & T. '48a, 632 (all streams, especially near cascades); Gthr. '64a (Demerara; Essequibo; Rio Capin, Para; Rio

Capai; Bahia); Lütke. '75a, 184 (Rio das Velhas); Gthr. '68a, 239 (Huallaga); Steind. '74a, 26 (Orinoco; Essequibo; Amazon; Rio Plata; Rio San Francisco; Rio Una); Cope, '78a, 694 (Peruvian Amazon); Steind. '78a, 31 (Rio Magdalena); Steind. '80a, 14 (Cauca); Steind. '82a, 11 (Huallaga).

Erythrinus macrodon Agassiz '29, 43, pl. xviii. (Almada, Prov. Bahia; San Francisco); Schomb. '41, 41a (all rivers of Guiana).

Erythrinus microcephalus Ag. '29, 44 (San Francisco).

Erythrinus brasiliensis Spix. '29, 45, pl. xx. (Pernaguacu); M. & T. 48a, 633 (all streams); Cast. '55a (Carandahy, Rio das Mortes, Minas Geraes.)

Macrodon guayana Val. '33, 179, pl. 48, fig. 1; C. & V. xix. 527 (Lake Tacarigua).

Macrodon auritus C. & V. xix. 519 (Montevideo); Steind. '69b, 12 (Montevideo).

Macrodon teres C. & V. xix. 521 (Lake Maracaibo).

Macrodon patana C. & V. xix. 522 (Cayenne).

Macrodon aimara C. & V. xix. 523, pl. 586 (Cayenne).

Macrodon ferox Gill '58a, 51 (Trinidad).

Macrodon intermedius Gthr. '64, 282 (Cipo River); id. '80a (La Plata).

Habitat: Eastern slope of South America from La Plata to Rio Magdalena and Huallaga.

Valenciennes united the species mentioned by Agassiz and Spix with the *Tareira* of Marcgrave, but separates numerous other species from it on slight differences. Steindachner, in his papers on the Fishes of the Magdalena and on the Fishes of Southeastern Brazil, has given his reasons for uniting all these species with the *tareira*. Bloch gives an easily recognizable figure of this species, but represents it as coming from Tranquebar.

We have been enabled to examine about 400 specimens, .035-.46 m., from 61 different localities: Para; Gurupa; Villa Bella; Avary; Montalegre; Arary; Porto do Moz; Obidos; Lago Alexo; Tonantins; Manaos; Tapajos; Santarem; Cudajas; Hyanuary; Manacapuru; Rio Negro; Silva, Lake Saraca; Teffé; Hyavary; Rio Negro, near Lago Alexo; Itabapuna; Tabatinga; Jutahy; Lago Maximo; Iça; Tajapuru; Maues; Jatuarana; Lago Iuparana; Serpa; Lago Alexo; Campos; Barra de Pirahy; Rio Parahyba; Paraguay; Ueranduba; Surinam; Rio das Velhas; Rio San

Francisco; Bon Jardin, R. S. F.; Rio Doce; Bahia; Santa Cruz; Santa Clara; Rio Mucury; Sao Matheos; Rio San Antonio; Rio Janeiro; Goyaz; San Gonçallo; Jequitinhonha; Rio Puty; Buenos Ayres; Rio Grande; Porto Alegre; Rio Arassuahy, Minas Geraes; Muriahe; Guiana; Rio Ipojuco, Province Pernambuco.

This seems to be one of the commonest food fishes of all the rivers east of the Andes. It is found in the whole course of these streams, occurring in the Amazons between Para and the Rio Huallaga.

The coloration varies considerably with the localities and with age, the different localities regulating the degree of light or darkness. In specimens .06 m. long there is a conspicuous dark lateral band from the tip of the snout to the base of the caudal; in larger specimens portions of the band become broadened to form blotches while the remaining portions are margined by a dark line and bordered by a light or silvery area; with age the band, and afterwards the blotches disappear; in the largest specimens the dorsal surface is thickly covered with small spots. The fin rays of the vertical fins are spotted and the spots frequently extend on the membrane to form bands. The pectoral and ventral fins are occasionally dusky without distinct spots. The belly is white, occasionally spotted; the chin frequently crossed by purplish bars; there is usually a round dark spot at the upper posterior angle of the caudal peduncle.

The scales are uniformly larger in this species than in *microlepis*. In a specimen .39 m. collected by Mr. Wheatland at Buenos Ayres there are 12, 11, 11, 9 series of scales from one lateral line to the other in respectively the first, second, third and fourth series behind the dorsal; this is due however to the splitting of the median scales of the back. Several other specimens present similar conditions. The scales of the lateral line vary from 39-43.

The size of the canine teeth and the lingual patches of teeth vary considerably. We have been unable to detect

any uniformity of variation, one organ varying indiscriminately of another.

The food of this species consists at least partly of other fishes.

II. ERYTHRINUS.

Erythrinus Gronow 1763, 114 (based on *Cyprinus cylindricus* L.=*C. cephalus* L. in part=*salmoneus*); Müller '42a, 308 (sp.); Müller & Troschel '45a, 5 (sp.); Gthr. '64, 283 (*unitæniatus*, *gronovi*).

Hetererythrinus Gthr. '64, 283 (*salmoneus*).

Type: *Erythrinus salmoneus* Gronow.

The *Erythrinus* of Cuvier, Müller and Günther is not the *Erythrinus* of Gronow. The latter has *salmoneus* for its type, and is identical with Günther's *Hetererythrinus*.

The species of this genus are smaller and less widely distributed than those of *Macrodon*.

ANALYSIS OF THE SPECIES.

- a. Pterygoids with teeth; dorsal rounded.
 - b. Caudal blackish; body usually with a dark lateral band; young without a humeral spot. *unitæniatus* 1.
 - bb. Caudal with four or five cross-bars of spots; sometimes a blackish spot near caudal; posterior portion of the body with vertical dark streaks. *salvus* 2.
- aa. Pterygoids without teeth; dorsal fin angular or pointed, some of the posterior rays being prolonged.
 - c. Ventrals not reaching beyond origin of anal. *erythrinus* 3.
 - cc. Ventrals reaching far beyond origin of anal; posterior dorsal rays longer than the head; upper parts and all the fins blackish; crown of the head with black dots (Günther). *longipinnis* 4.

1. *Erythrinus unitæniatus*.

Huri; Canhui; Wauben.

Maturaque Marcgrave, 1648, 169 (in standing water).

? *Synodontis palustris* Bloch & Schneider 1801, 398 (Brazil).

Erythrinus unitæniatus Spix. '29, 42, pl. 19 (San Francisco); M. & T. '45a, 5, pl. iii, fig. 1 (Brazil; Guiana); C. & V. '46, 486 (Mana; Cayenne; Bahia); M. & T. 48a, 632 (Canaku mountain streams); Gthr. '64, 283 (Demerara; Surinam; Es-equibo; River Capin, Para; River Capai; Bahia); Gthr. 68a, 239 (Trinidad); Steind. '74a, 28 (Rio Parahyba; Victoria; Bahia; Santarem; Villa Bella; Porto do

Moz; Obidos; Cudajas; Curupira; Tabatinga; Arary; Manes; Lago Jose Assu); Steind. '82a, 11 (Rio Amazonas; Iquitos).

Erythrinus vittatus C. & V., xix '46, 499, pl. 585 (Cayenne; Surinam; Brazil).

Erythrinus cinereus Gill. 58a, 53 (Trinidad).

Erythrinus kessleri Steind. 76b, 38 (Bahia).

Habitat: Rio Parahyba to Guiana and Peru; Trinidad.

The young of this species is sometimes uniform dusky, without spots on the fins. This is doubtless the condition figured by Marcgrave.

Dr. Gunther identified ('64, 283) *Erythrinus vittatus* C. & V., with *E. unitaeniatus*. He also ('68a, 239) pronounces specimens from Trinidad, presumably the *cinereus* of Gill, identical with *unitaeniatus*.

Dr. Steindachner ('76b, 38) described his *kessleri* from three specimens 2" 8'''-4" 6''' long, collected at Bahia. We have examined two of these specimens and also a number of others from the same locality, and have found teeth on the pterygoids in very narrow patches. On comparison with the smallest specimens from other localities, which were larger however, the pterygoid patches of teeth were a little wider. There cannot be the least doubt that the *kessleri* of Steind. is the young of *unitaeniatus*.

We have examined 90 specimens .07-.31 m. from Sao Matheos; Rio Doce; Bahia; Para; Cudajas; Obidos; Villa Bella; Serpa; Santarem; Silva, Lake Saraca; Hyanuary; Maues; Porto do Moz; Curupera; Tabatinga; Lake José Assu; Goyaz.

The typical specimens have a dark lateral band, which when present is most marked in specimens .20 m. long. This band is sometimes absent in specimens otherwise like those with the band. There are three dark bands extending from the eye to the edge of the opercle; these are also sometimes wanting. The dark opercular blotch can be seen in all specimens. Specimens .20 m. long from Sao Matheos are uniform dark-brown, the fins of a similar color, without any spots. Other specimens from the same

locality have the dorsal and anal spotted, and a dark spot at the base of each scale, and another has the dark lateral band. Two specimens, .09 m., from Goyaz, have the bands of the head and opercular spot quite marked, and the sides with more or less interrupted vertical streaks. In these specimens no pterygoid teeth could be detected—a condition which may be explained by their age.

In the young the pterygoid teeth are minute and in seemingly but a single series, or entirely wanting; in the old the patches are almost as wide as the palatine patches, and contiguous. The young of this species can be readily distinguished from that of *salmoneus* by the color.

2. *Erythrinus salvus*.

Erythrinus salvus Agassiz '29, 41 (San Francisco); M. & T. '48a, 632 (Forest Streams and Ponds).

Erythrinus gronovii C. & V. xix, '46, 500 (Cayenne); Gthr. '64, 284 (copied); Peters. '77a, 472 (Calobozo).

Habitat: San Francisco; Guiana; Orinoco.

The species *salvus* and *gronovii* both differ from *unitæniatus* in the color of the caudal. The first was based on a specimen taken from the stomach of *Macrodon*. The difference in the localities seems to be the chief reason for separating the species.

3. *Erythrinus erythrinus*.

Cyprinus cylindricus L. Mus. Ad. Fred. 77, pl. 30, 1754.

Cyprinus cephalus L. 1758, 322; 1766, 527 (in part).

Erythrinus Gronow. 1754, ii. 6, No. 154, pl. 7, fig 6 & 1763, 114.

Synodus erythrinus Bloch & Schn. 1801, 397.

Erythrinus salmoneus Gronow '54a, 170 (Surinam); Gthr. '64, 284 (Surinam; Rio Cupai); Steind. '76b, 39 (Gurupa; Santarem; Tabatinga; Cudajas; Ueranduba; Tajapuru; Lago Alexo; Manacapuru); Cope '78a, 694 (Peruvian Amazon).

Erythrinus brevicauda Gthr. '64, 285 (hab.?); Cope, '78a, 693 (Peruvian Amazon).

Habitat: Rio Jauzeiro to Surinam and Peru.

Dr. Steindachner gives a good description of this species and identifies both the *longipinnis* and *brevicauda* with it.

As we have not been able to find any specimens with fins approaching the length described for *longipinnis* we have kept that species distinct.

Sixty-six specimens, .055-.175 m. Surinam; British Guiana; Gurupa; Tajapuru; Porto do Moz; Santarem; Cudajas; Lago Alexo; Manacapuru; Teffé; Tabatinga; Rio Janeiro; Ueranduba.

In the specimens examined the ventrals were never found to extend beyond the origin of the anal, and the longest dorsal ray is always shorter than the head. The young of this species can readily be distinguished by the large caudal and humeral spots; the sides of the young are usually marked with dark cross shades.

4. *Erythrinus longipinnis*.

Erythrinus longipinnis Gthr. '64, 285 (Essequibo).

Habitat: Essequibo.

III. PYRRHULINA.

Pyrrhulina C. & V. xix. '46, 535 (*filamentosa*).

Holotaxis Cope. '70a, 563 (*melanostomus*).*

Type: *Pyrrhulina filamentosa* C. & V.

This genus embraces all the smaller *Erythrininae*. The largest scarcely exceed .10 m. in length.

ANALYSIS OF THE SPECIES.

- a. A black band through the opercle and orbit around the edge of the premaxillary, another around edge of mandible; brownish above, yellow below; lateral scales with orange base and brown edges, forming longitudinal lines. D. 9; A. I. 10; Lat. 1. 25 (Cope). *melanostoma* 1.
- aa. Band if present not extending around premaxillary.
- b. A large black saddle below and in front of dorsal; eye $3\frac{1}{2}$ in head; chin very prominent; maxillary teeth as large as those of the premaxillaries; distance of origin of dorsal fin from snout $\frac{1}{2}$ longer than its distance from caudal. Pectorals reaching ventrals; ventrals filamentous, reaching anal. Median dorsal and longest caudal rays filamentous. Scales orange at base with broad blackish margins. Mandible black edged. Head 4; depth 4; D. 10; A. 10; Lat. 1. 26, tr. 5. *lata* 2.

*The type of *Holotaxis* very probably has but a single series of teeth in the upper jaw, in which case the genus *Holotaxis* may be retained distinct.

- bb. Back without a saddle-shaped spot.
- c. Intermaxillary with two series of teeth.
- d. Lat. l. 25-26 (30 according to U. & V.); a black band from edge of opercle around snout, the margin of the mandible being black; origin of dorsal equidistant from base of middle caudal rays and base of pectoral. D. 9; A. 10. *filamentosus* 3.
- dd. Lat. l. 23-25; a black band from end of opercle around snout and lower jaw, continued on anterior portion of body; sides otherwise light brown. Head $4\frac{1}{2}$; depth $3\frac{1}{2}$; D. 10; A. 9-11. *semifasciata* 4.
- ddd. Lat. l. 20-21.
- e. Caudal peduncle little if any longer than snout and eye; female light brown; male with a dark lateral band and the ventrals margined with black. Dorsal low, rounded, its spot indistinct, confined to the middle of the anterior rays, origin of dorsal about equidistant from base of middle caudal rays and base of pectoral. Caudal lobes equal. Head $3\frac{1}{2}$ -4; depth $3\frac{1}{2}$; D. 10; A. 11-12. *brevis* 5.
- ee. Caudal peduncle little shorter than the head; height of dorsal much greater than length of head, the spot large and distinct reaching to tip of the anterior rays, origin of dorsal equidistant from caudal and posterior margin of orbit. Head $4\frac{1}{2}$; depth $4\frac{1}{2}$; D. 10; A. 10. *maxima* 6.
- cc. Intermaxillary with a single series of teeth.
- f. Origin of dorsal behind origin of ventrals.
- g. Lat. l. 20; caudal peduncle equal to the head in length; dorsal short and high, its highest rays sometimes reaching caudal; origin of dorsal equidistant between bases of ventral and caudal or nearer base of caudal. Upper caudal lobe much longer than the lower. Dorsal spot margined with white below; a black spot at base of lower caudal rays. Head $4\frac{1}{2}$; depth $4\frac{1}{2}$ -6; D. 10; A. 11. *nattereri* 7.
- gg. Lat. l. 23-24; caudal peduncle about equal to the head without opercle; dorsal comparatively low, its highest ray reaching little if any more than half way to base of caudal; origin of dorsal equidistant from caudal and anterior half of eye. Upper caudal lobe not much longer than lower. A dusky humeral spot; lateral scales with a bright silvery basal spot. Caudal and anal faintly barred. Head 4; depth $3\frac{1}{2}$ - $3\frac{3}{4}$; D. 10; A. 11. *guttata* 8.
- ff. Origin of dorsal over origin of ventrals, equidistant from base of upper caudal rays and anterior margin of orbit. Eye 3 in head. Olivaceous, a silvery spot at base of each scale; sides of head silvery. Head $4\frac{1}{2}$; depth $4\frac{1}{2}$; D. I, 9; A. I, 9; Lat. l. 25 (Cope). *argyrope* 9.

1. *Pyrrhulina melanostoma*.

Holotaxis melanostomus Cope. '70a, 563 (Pebas).

Habitat: Marañon.

This species is known from the type only. The two bands of the snout distinguish it.

2. *Pyrrhulina læta*.

Holotaxis læta Cope. '72a, 257 (Ambyiacu).

Habitat: Ambyiacu.

3. *Pyrrhulina filamentosa*.

Pyrrhulina filamentosa C. & V. xix. '46, 535, pl. 589 (Surinam); Gthr.

'64, 296 (Essequibo); Steind. '75a, 2 (Cayenne).

Habitat: The Guianas.

The type of this species is said to possess 30 scales in a longitudinal series. If this is so the specimens mentioned by Drs. Günther and Steindachner are distinct from it, as they have but 25-26 scales.

4. *Pyrrhulina semifasciata*.

Pyrrhulina semifasciata Steind. '75a, 2, pl. 1, fig. 1-2a (Stagnant water near Barra do Rio Negro; Cudajã; Gurupa; Tabatinga).

Habitat: Amazons from Gurupa to Tabatinga.

About two hundred specimens, the largest 09 m.

Tabatinga; Cudajã; Obidos; Hjanuary; Jose Fernandez; Manacapuru; Jutahy; Ourupira; Santarem; Silva, Lake Saraca; Villa Bella; Gurupa.

Teeth of the outer dentary series decidedly longer and stronger at the side of the jaw; teeth of the outer intermaxillary band strongest at the middle of the mouth. Usually very light brown. Adult with a band extending from the symphysis about half way to the caudal. In the male a dusky area below this band. Sometimes one or two accessory bands similar to the median band. In the young this band extends little beyond the first scale behind the head. A dusky area at the occiput, another some distance in front of the dorsal, an orange streak between them. The dorsal spot is margined below by a slightly lighter area; the caudal is frequently indistinctly barred; the outer or anterior rays of the fins frequently white.

Ventrals sometimes reaching anal, usually falling far short of the anal.

5. *Pyrrhulina brevis*.

Pyrrhulina brevis Steind., '75a, 6, pl. 1, fig. 3-4 (Mouth of Rio Negro; Cudajas; Tabatinga; Rio Negro, near Manaus).

Over twenty specimens, the largest .065 m.

Tabatinga; Lago Alexo; Cudajas; Manaus; Montalegre; Obidos; Villa Bella.

This species is closely related to *semifasciata* and *guttata*.

In the female the sides are plain with sometimes lighter spots at the base of the scales, as in *guttata*. There is usually a dark band on the side of the head. In the males there is a dusky line along the head and the sides, regions below the level of this line in the adult are also dusky. The fins in the male are also slightly margined with dark. The dorsal spot is indistinct. In three specimens .028 m. long, from Tabatinga, there is a conspicuous dark serrate-margined band from the caudal to the head, and a narrower smooth-margined one on the head. The dorsal spots in these specimens are much more marked than in the larger. Four specimens from Montalegre, the smallest .03 m., have the sides plain, and two male specimens from Cudajas, .055 m., have a dark blotch behind the head. The fins are much better developed in the male than in the female. The ventrals in the male reach to the anal, and the anal to the caudal. The longest ray of the dorsal is little longer than the head.

Our specimens do not agree with Dr. Steindachner's figures in the position of the dorsal and anal.

6. *Pyrrhulina maxima* sp. n.

Type No. 6343; one specimen. .08 m. to base of caudal. Tabatinga. Bourget.

This species is closely related to *P. brevis* and *P. nattereri*. Its color and dentition distinguish it from *nattereri*, while its long caudal peduncle, the position of the dorsal and color serve to distinguish it from *brevis*. The scales are

partly lost, so an exact count is impossible. As already stated, Dr. Steindachner's figures of *P. brevis* do not agree with the specimens examined by us. The comparisons made in the key are based on the specimens examined.

7. *Pyrrhulina nattereri*.

Pyrrhulina nattereri Steind '75a, 8, pl. ii, fig. 5-5a (mouth of Rio Negro; Obidos).

Habitat: Amazons from Obidos to Cudajas.

One hundred and sixty specimens, the largest .055 m. Rio Trombetas; Villa Bella; Manaus; Silva, Lake Saracá; Hyannuary; Cudajas; Jatuarana; Obidos.

This is the most slender species of *Pyrrhulina*. It can easily be recognized by the color. Each scale has a silvery center and dusky margin. In some specimens the color markings of the lower half of the sides are obliterated by a dusky lateral band, the region above it being lighter than usual. The fins vary greatly in height. In the largest specimen the height of the dorsal is little less than half the length, and the ventrals reach beyond the base of the anal. Usually the dorsal does not reach to the caudal, and the ventrals not to the anal.

8. *Pyrrhulina guttata*.

Pyrrhulina guttata Steind. '75a, 10, pl. ii, fig. 6-6a (Obidos; Cudajas; Tabatinga; Rio Negro).

Habitat: Amazons from Gurupa to Tabatinga, Rio Negro.

The relative abundance of this species may be seen from the number of specimens from each locality.

Gurupa, 3 specimens; Tajapuru, 11; Villa Bella, 6; Obidos, 399; Santarem, 1; Manacapuru, 24; Cudajas, 8; Tabatinga, 31; Curupira, 2.

The largest specimen is from Cudajas, and measures .098 m. The color varies greatly, the markings are more constant. The specimens from Cudajas are light straw colored; those from Obidos dark brown, lighter below. There is usually a silvery white spot at the base of each scale of the sides; they are sometimes found on the median scales of the tail

only, and sometimes entirely wanting. The sides of the head and snout are always plain. The dorsal spot varies in size and intensity of color; the middle caudal rays have three faint dusky cross-bars; the middle of the last anal ray is usually milky white, the white being bordered above and below by dusky areas; tips of the outer ventral rays usually milky white.

Fins always low, the ventrals not nearly reaching the vent.

9. *Pyrrhulina argyrops*.

Pyrrhulina argyrops Cope '78a, 694 (Peruvian Amazon).

Habitat: Marañon.

This species is known only from the types; it may be distinguished by the relative position of its dorsal.

IV. LEBIASINA.

Lebiasina C. & V. xix, '46, 531 (*bimaculata*).

Type: *Lebiasina bimaculata* C. & V.

The single species of this genus is found in the western streams of Peru and Ecuador.

1. *Lebiasina bimaculata*.

Lebiasina bimaculata C. & V. xix, '46, 531, pl. 587 (Remac, near Lima);

Gthr. '64, 286 (Bay of Callao; Western Andes of Ecuador): Steind.

'79a, 22 (Rio Remac, near Callao and Lima; Rio Jurumilla; Pascamayo).

Habitat: Western slopes of Peru and Ecuador; Callao Bay.

Sixty-two specimens, .05-.19 m. Rio Remac, near Callao and Lima.

In the general shape this species resembles the species of *Macrodon* and *Erythrinus*. Sides with a faint band; a conspicuous black spot at base of middle caudal rays; a fainter one behind the head.

D. 10; A. 11. Lat. 1. 25.

V. STEVARDIA.

Stevardia Gill, '58a, 63 (*albipinnis*).

Corynopoma Gill, '58a, 65 (*riisei*); Gthr., '64, 287 (sp.).

Nematopoma Gill, '58a, 68 (*searlesii*).

Type: *Stevardia albipinnis* Gill.

As far as known, the members of this genus, four in number, are confined to the Island of Trinidad. The species were at first described under three generic names. We have followed Dr. Günther in uniting them. The name *Stevardia*, however, has priority over *Corynopoma*.

ANALYSIS OF THE SPECIES.

- a. Anal rays decreasing in height backward; caudal lobes subequal.
 - b. Opercle with a triangular, spiniform dilation behind. Eye $3\frac{1}{2}$ in head, 1 in interorbital. Dorsal $\frac{1}{2}$ higher than long. D. 10; A. 20; l.l. 40; tail with a dark lateral stripe; fins white. (*Stevardia*.) *albipinnis* 1.
 - bb. Opercle with a posterior triangular dilation, continued in a more or less long and slender compressed process; last two or three anal rays produced. (*Corynopoma*.)
 - c. D. 8; A. 27. Anal three times as long as the dorsal; opercular process deflected, advancing but little beyond the inner angle of the base of the pectoral; color as in *albipinnis*. *riisei* 2.
 - cc. D. 9; A. 31. Dorsal more than twice as high as long; opercular process deflected at its base, then advancing upward with a curve and terminating on a line with the base of the ventral; color as above. *veedonii* 3.
 - aa. Anal rays increasing in height posteriorly; lower caudal lobe much longer than upper; opercular process continued in a filament which extends beyond the dorsal. D. 10; A. 26-29; Lat. 1. 42. Eye less than 3 in head, more than 1 in interorbital. Highest dorsal ray five times the length of the base of the dorsal. Base of anal $3\frac{1}{2}$ that of the dorsal, its height not much more than half that of the dorsal. Pectorals extending as far as the ventrals, beyond the origin of the anal. *searlesii* 4.
1. *Stevardia albipinnis*.
Stevardia albipinnis Gill '58a, 65 (Trinidad).
Corynopoma albipinne Gthr. '64, 287 (copied).
 2. *Stevardia riisei*.
Corynopoma riisei Gill '58a, 66 (Trinidad); Gthr. '64, 287 (copied).
 Lütk. '74a, 224.
 3. *Stevardia veedonii*.
Corynopoma veedonii Gill '58a, 67 (Trinidad); Gthr. '64, 287 (copied).
 4. *Stevardia searlesii*.
Nematopoma searlesii Gill '58a, 69 (Trinidad).
Corynopoma searlesii Gthr. '64, 288 (copied); Lütk. '74a, 222 with fig. (Trinidad).

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EXPLANATION OF THE FIGURES.

pr.—premaxillary.

mz.—maxillary.

m.—mandible, side view.

m'—mandible, viewed from above.

1.—*Mucrodon malabaricus* Bloch.

2.—*Erythrinus unitaeniatus* Spix.

3.—*Pyrrhulina guttata* Steindachner, $\times 4$.

4.—*Pyrrhulina maxima* sp. nov.

5.—*Lebiasina bimaculata* C. & V., $\times 4$.

A COLLECTION OF PLANTS FROM BAJA CALIFORNIA, 1889.

BY TOWNSHEND S. BRANDEGEE.

On the morning of January 11th, the writer landed at the small settlement known as Magdalena Bay, situated upon Magdalena Island near the western coast of Southern Baja California. The sky was cloudless, the sun was bright, the air warm and delightful, and best of all, the shores of the bay and sides of the hills abounded with strange and interesting plants in full bloom. Magdalena Island is a range of hills or mountains, a mile or more wide and about twelve miles long, continued northward as a narrow strip of sand to the high, rocky promontory, Cape San Lazaro, then as a sand flat again to the Boca de Soledad. Most of this long distance is separated from the mainland by a channel of water, called upon the map "Lagoon." These lagoons are continued northward to San Jorge, forming a smooth inland passage for boats. There are three "bocas" north of Magdalena Bay through which the tides rush in and out, meeting at certain well known points. These lagoons or "esteros" are generally fringed with bushes or small trees of *Rhizophora*, fifteen feet high, that at low tide seem like a small forest standing on a framework or on stilts. In some places the branches and roots, near high tide mark, are covered with shellfish of some kind, giving rise to a common saying that oysters grow on trees. In the mountains and on the sand flats about the town of Magdalena Bay, one hundred and fifty-six species of plants were found, many of them to be seen at no other place, excepting Santa Margarita Island. No large trees grow on Magdalena Island, and the only arborescent vegetation is *Veatchia*, but *Bursera Hindsiana*, *Jatropha canescens*, *Maytenus* and *Fouquieria* become almost tree-like. The sand flats are covered with an annual *Abronia* that fills the air with its fragrance; along

the beach are lines of the pink flowers of *Hofmeisteria*; yellow and white species of *Perityle* grow almost everywhere; the curious and handsome *Gongylocarpus fruticulosus*, hitherto almost unknown, is one of the most common plants, and the blue flowers of *Jacquemontia abutiloides* grow side by side with the scarlet blossoms of *Mamillaria Halei*. At this time most of the plants are in bloom, but not even space enough to notice the striking ones can be afforded here.

The collection of Magdalena plants having been completed, Mr. J. P. Hale kindly allowed me to become a passenger on his launch, which was then ready to leave for San Gregorio. Progress up the lagoon was slow, the wind was unfavorable, the tides were always the wrong way, but, in consequence, frequent landings furnished opportunities for collecting new and rare plants from the sandy shores. Finally, after a week's voyage, and having gone to sea through the surf at the Boca de las Animas, San Gregorio was reached and the work of collecting resumed. Here so many plants appeared it seemed a different flora from that of Magdalena Island, and species before seen varied so much from their island form as to have a strange appearance. The sandy soil is covered with the large flowered annual *Ænothera sceptrostigma*, which, after opening its flowers at nine o'clock in the morning, colors the hills yellow. *Prosopis*, *Parkinsonia*, *Atamisquea*, *Schæpfia* are common bushes or trees, but are exceeded in height by the abundant *Cereus Pringlei*. *Jatropha*, *Bursera*, *Opuntia*, etc., are more common than on the island and, as is the case with most of the vegetation within eight or ten miles of the ocean, have growing upon them an abundance of the lichen "orchilla," that affords employment for most of the inhabitants along the coast of this region. This orchilla is picked from the cactus and bushes, sent to Magdalena Bay and from there shipped to England to be used in the process of dyeing.

One of the interesting plants common about San Gregorio,

is *Ipomœa Jicama*, a woody species climbing about other plants, and rarely producing large white flowers. Its roots bear tubers that are much sought for on account of their fine flavor and watery juice. One weighing six pounds is said to have been found, and traditions of a ten-pounder are extant, but the largest seen weighed two or three pounds, and they are usually much smaller. These tubers must grow very fast during the rainy and Spring season, for their location, often three feet or more from the base of the stems, is discovered by the growth cracking the soil. New stems never spring from them, and their use to the parent plant is uncertain. Perhaps it is to store up moisture to be drawn upon during the dry season. These round tubers or "jicamas" are always eaten raw, and resemble in taste a very tender turnip somewhat sweetened. Wherever the plant grows near habitations or along trails, numerous little holes may be seen around the plant at distances varying from two to four feet, showing the places from which the tubers have been dug.

From San Gregorio, with a Mexican guide and three mules, a trip was made to Purisima, an old mission, having now a population of two or three hundred persons living along the small stream that irrigates their vineyards, fig and orange trees. On leaving the sea coast new plants appear within a few miles; among the first is "Pitahaya dulce," a species of cactus producing edible fruit, and soon Dr. Kellogg's large yellow-flowered *Ipomœa (I. aurea)* is seen in abundance, climbing over the leguminous bushes. After two or three days spent in collecting about Purisima, the trip was continued up the cañon and around over the high mesas, black with volcanic rock, and down into the cañon of Comondu. The most conspicuous plant of these high mesas, at that time of the year, was an *Agave* about ten feet high, with long radical leaves and a panicle of half a thousand dark yellow flowers. Comondu is a settlement nine miles in length along a little brook in a narrow cañon, three

to five hundred hundred feet high, with its steep slopes crested by a line of perpendicular cliffs. It was at the base of these cliffs that the interesting *Lopezia clavata* and *Polygala apopetala* were found. From Comondu to San Jorge, the head of the "estero," thence by boat to Magdalena—and the first excursion was finished.

At Magdalena Bay I found Walter E. Bryant and Charles D. Haines, who had been sent upon a collecting expedition by the California Academy of Sciences, and together we went to Santa Margarita Island. I had expected to find on that large island a more southern flora, and was somewhat disappointed to see repeated in its vegetation the plants of Purisima and Comondu, together with those of Magdalena Island, but some few not seen before were collected, and most of them proved to be undescribed. *Veatchia* grows larger upon Santa Margarita than at any other locality; some fine old trees were two feet in diameter and twenty feet high. *Maytenus*, called "mangle dulce," also grows to a very large size, and in some portions of the island nearly all the vegetation was found to be unusually luxuriant. Returning to Magdalena, we went up the "estero" to San Jorge and then again to Comondu.

Two weeks diligent collecting along the cliffs and upon the mesas, afforded a very complete representation of the flora of Comondu and vicinity, including many plants that were not in bloom at the time of the previous visit. Then, with Mr. Bryant, Mr. Haines, a pack train and guides, the journey northward through the center of the peninsula was begun. The start was made with some misgivings as to the result, for we knew there was a ride of nearly five hundred miles before us through a dry, desolate, rocky and almost uninhabited region.

From Comondu, for the first week, no great change was observed in the flora, few plants were collected and these were mostly species of *Atriplex*. At a small place called San José de Gracia, *Rhus laurina* was first seen, *Viscainoa*

had become abundant and we had passed through several "cardon" (*Cereus Pringlei*) forests. A fine large ash grew here and at San Benito, a cañon that would have well repaid a more careful search. From this place to San Ignacio, forests of the tree yucca were the characteristic vegetation. San Ignacio, an old mission, probably has a larger population than that of Purisima, and looks like an oasis in a desert. It is a forest of date palms, with gardens where the soil is not too alkaline. In the distance could be seen the extensive saline flats about the San Ignacio lagoon, apparently barren, but doubtless producing many interesting chenopods, for which there was no time to make a "side trip." Some plants, lovers of alkaline soils, such as *Wislizenia*, *Hymenoclea*, *Atriplex*, etc., were common about San Ignacio. Different Californian genera appeared every day as we moved northward over the high mesas; *Pectocarya*, *Chorizanthe*, *Eriogonum*, *Allium* and others, became abundant before San Julio was reached.

There is a cañon at San Julio eight hundred feet deep and apparently with nearly perpendicular walls. A day's "stop over" enabled me to work my way in and out of it down the cliffs among the cacti and around bushes and rocks. Very many interesting plants were found in the bottom of the cañon, but the most interesting of all was *Prunus ilicifolius*, growing here—its most southern known habitat—in exactly its Santa Cruz Island form. Many of them were more than a foot in diameter and fifteen feet high, with rough bark and lanceolate entire leaves. A few days later our progress brought us to plenty of it, growing in the usual bush form. At San Pablo *Veatchia* re-appeared on the mountains, and was afterwards often seen until we reached San Fernando.

The trail from San Ignacio passed over high mesas, down and up deep rocky cañons all the way to San Pablo, and mostly over sandy plains from there to Calmalli. A great change in the vegetation took place in this vicinity, and many of the characteristic plants of the south, that were

abundant even on the sandy plains about Cardon Grande, had now disappeared, and thenceforward, until we reached the gulf coast at the soda springs of Calamujuet, the flora resembled that so familiar to us in southern California.

At Calamujuet, *Dalea spinosa*, *Olneya Tesota*, *Chilopsis saligna* and other Arizona plants formed a large part of the vegetation, although the most conspicuous of all was *Veatchia*, which now, having lost its leaves, was coming into flower—the trees covered with pink blossoms, forming a perfect blaze of color which could be plainly seen miles away.

Leaving Calamujuet and Santa Maria, it soon became evident that the flora of the Gulf coast did not continue far westward, the plants of San Diego becoming more and more abundant to the end of our ride at San Quintin, which place, our point of embarkation, after a toilsome journey of two months, we reached May 22d, rejoiced to find ourselves and collections in safety.

Very little has heretofore been known concerning the botany of southern Lower California. The small collection made by Mr. Hinds, of H. M. S. Sulphur, at Cape San Lucas, and more especially at Magdalena Bay, in November, 1839. and that of Mr. Xantus from the Cape in 1860, afforded nearly all that was known concerning its vegetation until last year Walter E. Bryant, the ornithologist, made a small but valuable collection from Magdalena and Santa Margarita Islands and Comondu, and Dr. Palmer visited Los Angeles Bay and Muleje, and this year Lagoon Head. All these collections abound in rare and interesting plants.

The distribution of a flora depends somewhat upon the topographical features, and it may be necessary to briefly explain them here. The Peninsula is a long strip of land, in places not more than sixty miles wide, consisting of a mountain range, with its backbone and peaks often two to four thousand feet high, near to the Gulf shore, thence sloping more or less gradually to the Pacific. West of San

Ignacio, the Santa Clara Mts., a high range, run westward toward Cerros Island, and all drainage from the interior, north of San Ignacio as far as to El Campo Aleman, comes into the San Ignacio Lagoon. El Campo Aleman is on the dividing line between the drainage to San Ignacio on the south and Black Warrior Lagoon on the north. The climate is much warmer on the Gulf coast than on the Pacific.

In conformity to the physical features, modified by climate and differences of latitude, the flora of the region may be subdivided more or less distinctly as follows: That of the Pacific coast, resembling that of the more northern shores, with some species from the south very abundant, plants that are also found as far north as Florida, on the Atlantic side, such as *Laguncularia*, *Avicennia*, *Rhizophora*, *Maytenus*, etc.; the Arizona flora comes down the Gulf side and spreads over to the west, south of El Campo Aleman; the Sonora and Guaymas flora, as represented by Dr. Palmer's collections, will probably be found abundant on the southern Gulf coast, and certainly appears to be well represented in the interior in the same latitude. El Campo Aleman, on the dividing line between northern and southern drainage, is a well marked point of separation between the flora of the north and that of the south. The flora north of this place, except on the Gulf coast, resembles that of the region about San Diego.

Some species, stragglers from a more southern Mexican flora, grow in the south, and doubtless many will prove to be endemic to the Peninsula when all the neighboring mainland regions shall have been thoroughly explored.

No running streams come down the cañons and gulches into the Pacific Ocean. The waters that irrigate the gardens of Purisima and Comondu disappear as soon as they leave the volcanic rock; and, during the trip northward, water was found only at few springs and in deep holes in rocks, filled at the time of the rainy season, some of them

like Agua Dulce, stagnant and green, because, as the guide said, it had not rained enough for six years to make the pool overflow. Plants in bloom can be found at any time of the year, but the majority, and especially the annuals, blossom after the fall and winter rains have begun. The luxuriance of the flora depends upon the amount of the rainfall, probably even more than does the familiar flora of California.

At Magdalena Bay and San Gregorio, annuals were nearly all well developed in January and February, and by April most of them had dried up and disappeared. Many shrubs were in mature fruit early in January, and had evidently flowered in November and December. Most of the different species of cactus and many perennials do not blossom until the hot weather of April and May. Farther northward, of course, the seasons are later, and winter-bloomers are not so numerous.

Cactaceæ are extremely abundant and the most noticeable portion of the flora north and south, often forming forests and impassable thickets and, in May, adorning the landscape with showy flowers. Agaves are common and in some localities cover the ground; when blooming they are always conspicuous. Leguminous trees of several genera are abundant and furnish much of the wood used for various purposes. The multitudes of cactus bear spines, straight or hooked, almost every shrub or bush is thorny, and even the ground is often covered with old prickly burrs of an annual grass (*Cenchrus*).

Some of the native plants afford products useful to the inhabitants. The collecting of "orchilla" gives employment to many persons. Several species of cactus bear delicious fruits, and the juice of the plants will quench thirst in time of extreme need; the bark of *Veatchia*, *Lysiloma* and *Bursera* is used for tanning hides; "jicamas" are liked by everyone; *Maytenus*, *Prosopis*, *Cereus* and *Opuntia* supply firewood; the stems of a *Cereus* are used for stupefying fish; several species of *Agave* are responsible for the

intoxicating "mescal;" the leaves and twigs of *Prosopis* are excellent grazing for mules, and "burros" live upon *Bursera Hindsiana* when grass has disappeared. *Lippia* gives a fragrance to cooking meats, and different plants under the name of "damiana" are used as a substitute for tea. Many have reputed medicinal virtues and supply nearly all the medicines used. *Larrea* and *Euphorbia* are held in high esteem for their curative properties, and it is difficult to find any common, ill-smelling plant that, for some ailment or other, is not "buena para medecina."

The vegetation of a country shows unerringly the characteristics of its climate, and the list of plants collected in Lower California recalls the dry and arid regions of Arizona and Sonora.

The accompanying map, a reduced copy of one published by the Coast Survey and carried during the trip, shows the route travelled. The many names might convey an impression that it was a thickly settled country, but it must be remembered that they are only the local names for springs, water holes and in some instances of "dry camps," where the distance to next water was a day and a half of travel. Very few people live on the Peninsula between San Ignacio and San Fernando, and, during two weeks of travel, sometimes not a single person was to be seen.

One of the results of this trip has been the re-collecting of the little-known plants from Magdalena Bay, described in the Botany of H. M. S. Sulphur, and many points left doubtful by the fragmentary specimens at Mr. Bentham's command, have been thus cleared up. It is much to be regretted that the limited facilities for transportation and opportunities for drying plants, especially on the long overland journey, prevented the making of many duplicates.

Among the many persons to whom thanks are due for courtesies and assistance, special mention must be made of Mr. J. P. Hale, whose guest I was during my sojourn in his extensive domains.

In the following list, the most southern habitat at which they were seen is given for California and Arizona plants.

CLEMATIS PAUCIFLORA Nutt.—San Sebastian, El Rancho Viejo.

DELPHINIUM CARDINALE Hook. The flowers are sometimes yellow.—San Pablo, San Quintin.

DELPHINIUM PARISHII Gray.—San Enrique and northward.

DELPHINIUM CONSOLIDA L.—Escaped, and growing along irrigating ditches at San Pablo.

CROSSOSOMA BIGELOVII Watson.—El Rancho Viejo, Paraiso.

BERBERIS FREMONTI Torr. Growing in great rounded clumps 10 feet high—San Sebastian, El Rancho Viejo.

ESCHSCHOLTZIA CALIFORNICA Cham.—This plant was first seen growing in its perennial form on the banks of irrigating ditches at San Pablo, where it had probably been introduced. As a native plant it appeared at El Campo Aleman, and northward became common, larger flowered, annual or perennial with torus of variable width.

ARGEMONE MEXICANA L. var. *ALBA* DC. Very abundant and handsome, growing to a height of 6 or 8 feet. Not seen north of Calmalli.—San Gregorio, Comondu.

PLATYSTEMON CALIFORNICUS Benth.—Socorro.

DRABA CUNEIFOLIA Nutt. With lax filiform racemes eight inches long and thin leaves.—Growing in damp localities at San Pablo and San Esteban.

CARDAMINE PALMERI Watson. ? Specimens too young for certain determination.—San Gregorio.

ARABIS, sp. A single specimen resembling a purple-flowered *Cardamine*, and perhaps the species noticed in Bot. Sulph., p. 6.—Magdalena Island.

ARABIS ARCUATA Gray.—El Rancho Viejo.

ARABIS, sp.—San Ignacio.

SISYMBRIUM REFLEXUM Nutt.—San Gregorio.

SISYMBRIUM CANESCENS Nutt.—San Gregorio.

THELYPODIUM, sp.—Magdalena Island.

NASTURTIIUM TANACETIFOLIUM (Wall.) ?—Purisima.

NASTURTIIUM (?) *LAXUM* Watson. Evidently the same plant, but the segments of the lower leaves are more numerous than described. The immature pods are more than 12 mm. in length, slightly 4-angled, valves 1-nerved, cotyledons incumbent, seeds in one row, 10 to 12 in each cell.—San Gregorio.

NASTURTIIUM CURVISILIQUA Nutt. var. *LYRATUM* Watson.—San Ignacio.

LYROCARPA XANTI, (Plate II). Annual, branching near the base: stems decumbent, a foot or two long: leaves, sepals and ovary somewhat pubescent, with branching hairs: leaves all petioled, cordate-lyrate, repand, 2-4 inches long, 1-2 inches wide: flowers in an elongated leafless raceme, dark purple: petals obovate-lanceolate, 9 lines long: pods nearly an inch in length, not constricted above, cells 5-10 seeded; seeds wingless.

This is probably the plant mentioned in Bot. Cal. 44 and Proc. Am. Acad. V, 153. The bright colored, handsome flowers and habit of growing in masses make it one of the most showy annuals of the region. The seeds differ from the generic description in being wingless.—San Gregorio and Santa Margarita Island.

LYROCARPA COULTERI Hook. & Harv. Suffrutescent, much branched from the base and perennial.—San Gregorio and northward.

LEPIDIDIUM LASIOCARPUM Nutt.—San Gregorio.

THYSANOCARPUS CURVIPES Hook.—San Julio.

THYSANOCARPUS LACINIATUS Nutt. A small leaved form.—El Rancho Viejo.

BISCUTELLA CALIFORNICA Benth. & Hook.—Sand dunes of the southern coast and in the interior. A smoother form, 2 feet high with small pods, grows on the ocean side of Santa Margarita Island.

CLEOME ARBOREA (Nutt.)—Calamujuet to El Rosario.

CLEOME TENUIS Watson.—Comondu.

WISLIZENIA PALMERI Gray.—San Juanico. San Ignacio, Calamujuet. The specimens from San Juanico are more slender and branching than those from Calamujuet; in the former, all the leaves are trifoliate; in the latter, the upper ones are often simple. The pods vary much in size, reticulation and tuberculation, and in each cell two seeds often mature. In the specimens from San Juanico, the opening between the valves is evident, but in those from Calamujuet it is completely closed, even after the falling of the valves, by the persistent funicle. The distinction between some of these forms and *W. refracta* is very slight, and the great differences observed in the septum and in the relative stoutness of the style, almost lead one to doubt whether even the little-known *Oxystylis lutea* may not be more closely related than is generally supposed.

ATAMISQUEA EMARGINATA Miers. Specimens of this ill-smelling bush have also been collected from neighboring regions by Mr. Pringle and Dr. Palmer. It is undoubtedly this species, but the structure of the flower shows so much variation from the type described and figured in Linn. Trans. XXI, i, t. 1, that a somewhat detailed description is rendered necessary. The two outer large valvate sepals entirely cover the two inner alternate somewhat obovate ones, that differ from the figure in being much shorter and having a different form, but are of a similar color to the outer ones, and with them deciduous. Opposite to

the sepals are four tooth-like processes, alternating with the four petals and apparently in the same whorl; the two upper petals are somewhat longer than the lower. The irregularity of the flower is apparently caused by the elongating stipe of the ovary developing to the lower side, lifting and passing beneath the inferior tooth-like process that embraces it as an oblique ring; this tooth longer than the upper and four times longer than the lateral ones, becoming also superior. The stamens are six, gradually tapering, from a somewhat bulbous base, not abruptly as in the figure, and in the numerous flowers examined, no trace of staminodia has been found. The petals are all curved to the upper side.—San Gregorio.

OLIGOMERIS SUBULATA Bois. — Magdalena Island and throughout the whole region traversed.

HELIANTHEMUM NUTANS. Densely and minutely stellate pubescent throughout: stems woody, much branched, about 9 inches high: leaves linear, obtuse, slightly tapering to the base, 5–7 mm. long, 1 mm. wide: pedicels solitary from opposite to the axils of the upper alternate leaves, recurved, 14 mm. long, jointed near the base: inner sepals 6 mm. long, ovate, acute, the outer linear, half as long: petals slightly exceeding the sepals, broadly cuneate, acute: stamens about 20: seeds covered with white strap-shaped papillæ.

The lower portion of the small bushes is covered with fascicles of axillary leaves, that persist after the primary ones have fallen, and give to the plants an ericoid appearance.—Very abundant in rocky soil about the plains of San Julian.

IONIDIUM POLYGALÆFOLIUM Vent. *I. lineare* Torr.—Santa Margarita Island.

POLYGALA XANTI Gray. Agrees nearly with the description of this species in Proc. Am. Acad., V. 153. The speci-

mens from Santa Margarita Island are much taller, with narrower and more scattered leaves.—Magdalena and Santa Margarita Islands.

POLYGALA DESERTORUM. Stems erect, branched from a somewhat woody base, slightly pubescent, a foot high: leaves linear-lanceolate, 18 mm. long, tapering to the base, becoming bract-like above: flowers upon pedicels 2–4 mm. long, soon reflexed: sepals glabrous, all purple, the outer round, saccate at base, 4 mm. long, the lateral oblong, mucronate, 5 mm. long: upper petals pubescent near the base, nearly as long as the keel, connected nearly half their length, purple; keel rugose-thickened, yellow; crest recurved, prominent: style tortuous, recurved, hollow, somewhat two lobed; ovary stipitate: capsule elliptical, emarginate: seed densely hairy, the short caruncle with two small wings not $\frac{1}{4}$ the length of the seed.—Growing upon the plain near Agua Dulce. Its persistent purple sepals make this a handsome species.

POLYGALA APOPETALA, (Plate III.) Frutescent, 2–3 feet high, with straight, slender, grayish-pubescent branches: leaves lanceolate, entire, obtuse, attenuate to a short petiole, alternate, remote, nearly glabrous: flowers large, pink, on slender pedicels a half inch or more in length: sepals 4, the upper and lower small, equal, cymbiform, with ciliate margins, the lateral very large, nearly orbicular: petals 5, all separate, the two upper strap-shaped, revolute outward, $\frac{2}{3}$ as long as the keel, the lateral ones pointed, less than half as long, lying on the staminal tube and with it embraced by the large unguiculate cymbiform keel, which is open by the whole of the upper and a part of the lower edge, and not cristate nor appendaged: stamens 8, monadelphous for half their length, united with the petals only at the base, anthers often apiculate, sometimes by a process as long as the anther, opening by a transverse notch near the middle: ovary sessile; style curved, nearly simple, pubescent on its

upper third: seeds 2, large, ovoid, slightly flattened, pubescent, caruncle minute, hardly lobed.—Comondú.

KRAMERIA PARVIFOLIA Benth.—Magdalena and Santa Margarita Islands.

KRAMERIA BICOLOR Watson. The specimens are without fruit, but appear to be the same as Palmer's No. 37, 1885. The bush is, however, different in habit and lies prostrate upon the ground, with leaves and flowers at the ends of the branches.

FRANKENIA GRANDIFLORA Cham. & Schlecht.—El Rosario.

FRANKENIA PALMERI Watson.—San Gregorio, El Rosario.

CERASTIUM, sp.—Growing under rocks in San Julío Cañon. Plants very weak and straggling: seeds rough. Perhaps a form of some described species.

DRYMARIA VISCOSA Watson. Growing in sandy soil.—Magdalena Island, San Gregorio.

DRYMARIA CRASSIFOLIA Benth. *D. Veatchii* Curran, Proc. Cal. Acad., 2d Ser., Vol. I, 227. Prostrate, spreading and very variable, some of its varieties perhaps including *D. holosteoides* Benth., from Cape San Lucas, described as closely related.—Magdalena Island, Purisima.

DRYMARIA DEBILIS. Annual, erect, a span high, sparingly branched, with scattered rather long hairs throughout: leaves 6–8 mm. long, and often as broad, acuminate, subcordate or cuneate at base, tapering into a petiole longer than the blade: flowers few on pedicels an inch long or less: sepals ovate acuminate, hardly nerved, a line long, shorter than the bifid petals: capsule longer than the sepals, 10–20 seeded: seeds minutely roughened.—Purisima.

TISSA DIANDRA (Guss.)—Pozo Grande.

TISSA MACROTHECA (Hornem.)—Socorro.

TISSA RUBRA (L.)—San Gregorio.

LOEFFLINGIA SQUARROSA Nutt.—Calmalli.

PENTACÆNA RAMOSISSIMA (Weinm.)—El Rosario.

ACHYRONYCHIA COOPERI T. & G.—Magdalena Island.

PORTULACA PARVULA Gray. Agrees with the description of this species, but the shores of Magdalena and Santa Margarita Islands are very different habitats from the dry regions of Texas and Mexico.

PORTULACA OLERACEA L.—Found in many places.

PORTULACA RETUSA Engelm. ? Specimens too young for certain determination.—Magdalena Island.

CALANDRINIA MARITIMA Nutt.—Not uncommon between San Gregorio and San Quintin.

CALANDRINIA CAULESCENS HBK. var. *MENZIESII* Gray.—El Rancho Viejo.

FOUQUIERIA SPLENDENS Engelm. The flowers have often a yellow tinge.—Calmalli and northward.

FOUQUIERIA SPINOSA HBK. "Palo de Adam." The leaves fall in April while it is in full bloom.—Magdalena and Santa Margarita Islands and northward to Lat. 28°.

FOUQUIERIA COLUMNARIS Kellogg. *Idria columnaria* Kell. Proc. Cal. Acad. II, 34; Hesperian, May, 1860. *F. columnaris* Kell. Bull. Cal. Acad. i., 133. *F. gigantea* Orcutt, West Am. Scientist, II, 48. First seen near San Esteban, this tree was a prominent part of the vegetation nearly to El Rosario. It grows erect to a height of 25 to 50 feet, gradually tapering from a base two or three feet in diameter to a pointed top, and as it seldom branches, the shape is that of a huge inverted carrot. Sometimes from accident or injury, the main trunk separates into two or more straight or distorted branches and assumes curious forms. An abundance of small twigs 3-4 inches long, bearing leaves and spines or sometimes only fascicles of leaves, grow upon the trunk. The wood is very soft, and a knife

can be stuck through the tree unless at first the harder wood of the reticulated frame work is struck. The flowers, like those of the other species of the genus, grow from the top, and must be quite handsome; they are said to have a decided yellow tinge and to appear soon after the fall rains. The old capsules are 8-10 mm. long, sessile in a panicle, about 10 inches long. The leaves, as noticed by Dr. Engelmann concerning those of *F. splendens*, Bot. Gazette, Vol. VIII, 338, afford fine examples of the morphology of spines. The common name of the tree is "cirio," called so by the inhabitants on account of its fancied resemblance to the torch of the altar of their Church.

BERGIA TEXANA Seubert.—Comondu.

MALVA BOREALIS Wall.—Comondu.

MALVASTRUM TRICUSPIDATUM Gray.—Comondu, Purisima.

MALVASTRUM, sp. Too young.—San Gregorio.

ANODA HASTATA Cav.—Common in Comondu Cañon.

ANODA CRENATIFLORA Ort.? Radiate summit of fruit pubescent: cusps short: carpels 8-10, with mid-rib separating for the upper two-thirds: septum represented only by slender threads attached near the apex of the carpel and to the base of the column: clathrate covering of the seed purplish brown, white powdery, loose, cleft at the apex: seed pubescent with very fine hairs: petals 4 lines long, pale yellow, crenate.

As there is much uncertainty concerning the species of Ortega, it seems best not to give this plant another name, especially as it is near *A. parviflora*, to which the general resemblance is quite strong.—Steep slopes of Comondu Cañon.

ANODA PENTASCHISTA Gray. Plants slender, flowers small and leaves mostly narrowly linear.—Purisima, Comondu.

SIDA XANTI Gray. Plants very nearly answering to the description of this species in Proc. Am. Acad., XXII, 296, were collected at Purisima.

SIDA HEDERACEA Torr. —Abundant about San Ramon Lake near San Gregorio.

SIDA DIFFUSA HBK. —Comondu.

SIDA TRAGLÆFOLIA Gray. —Comondu.

ABUTILON CRISPUM Don. —Common throughout the southern portion of the Peninsula and on Magdalena and Santa Margarita Islands.

ABUTILON CALIFORNICUM Benth. A shrubby species, sometimes six feet high. —Common on Magdalena and Santa Margarita Islands, and abundant on the mainland.

ABUTILON LEMMONI Watson. Probably this species, although not exactly agreeing with it. —Las Huevitas.

ABUTILON INCANUM Don. Woody, 2 feet high. —San Gregorio.

ABUTILON JACQUINI Don. Agreeing well enough with specimens of this species, but much more viscous and with larger leaves. —San Esteban.

ABUTILON PALMERI Gray. A form of this species growing very luxuriantly on a portion of Santa Margarita Island where all the vegetation was rank. Leaves very long, on petioles very much longer than the pedicels: earliest flowers solitary in the axils, the lower jointed above the middle, the upper near the base. The axillary buds that are usually dormant in this species are, in these specimens, developed into long side branches, giving a very different appearance to the inflorescence. Seeds as in type specimens with which they were compared, appear under the lens to be roughened with white curved bristles arising from reddish papillæ.

HORSFORDIA NEWBERRYI Gray. Eight feet high at San Julian, and smaller northward.

HORSFORDIA PURISIMÆ. Frutescent, 2 feet or more high, erect, finely and softly pubescent: leaves cordate-acuminate or obtuse, less than an inch broad on petioles of the same length white-velutinous beneath, greener above: inflorescence long-paniculate, leafless: peduncles an inch long, jointed above the middle: flowers orange, 12 mm. broad: calyx 4 mm. long, lobes acute: carpels about 8, 6 mm. long, oblong, obtuse, in the same head either 1, 2 or 3 seeded: seeds minutely tuberculate-scabrous. The carpels, as in other species of this genus, and many of *Sphæralcea*, are attached to the base of the column by a slender thread that can be separated from the back as high as the notch. It resembles *H. rotundifolia* Watson, but is a woody perennial with more pointed leaves and very different fruit.—San Gregorio and Purisima.

HORSFORDIA PALMERI Watson. A small tree 12 feet high on Santa Margarita Island, and much smaller at Llano de Santana and San Gregorio.

SPHÆRALCEA COULTERI Watson. Differs from the described form only in its larger leaves, strictly annual habit and rather larger orange-yellow flowers. The horizontal projection at the base is as in Dr. Watson's original description. This plant is extremely abundant during the months of February and March in the southern region. On Santa Margarita Island it becomes four feet high, and covers large areas to the exclusion of other vegetation. In April it dries up and disappears.

SPHÆRALCEA AMBIGUA Gray. Six feet high.—San Gregorio, San Jorge.

SPHÆRALCEA, sp.—San Jorge.

SPHÆRALCEA, sp.—San Julio. The specimens of these two species lack fruit.

SPHERALCEA HAINESII. Herbaceous, about 8 feet high, with long slender branches, densely covered with a soft spreading stellate pubescence, becoming more glabrous in age: leaves cordate lanceolate, somewhat lobed, irregularly doubly crenate or dentate, 4 inches long or less, on petioles $\frac{1}{4}$ as long: axillary racemes solitary or geminate, 3 inches long or less: bracteolæ filiform, persistent: calyx white-lanate, deeply cleft, segments acute, longer than the fruit: petals brick-red, $\frac{1}{2}$ inch long: fruit higher than its width: carpels 10-15, attached at base by slender threads to the column, the small cusps turned outward and easily separating, basal portion short, reticulate: ovules 3, and usually maturing into 3 minutely pubescent seeds. Named for the collector, Charles D. Haines, who, as entomologist of the party, materially reduced the number of insects infesting it.—Collected at Jesus Maria.

KOSTELETZKYA DIGITATA Gray. The specimens are old and have lost the lower leaves, but seem near enough to the description.—Comondu.

HIBISCUS DENUDATUS Benth.—Magdalena Island and northward. Common.

HIBISCUS COULTERI Gray.—Purisima and other southern localities, but not common.

GOSSYPIUM HERBACEUM L.—Growing about the gardens of the old missions, Comondu and Purisima.

GOSSYPIUM DAVIDSONII Kellogg.—Magdalena Island, San Gregorio. This is without doubt the species noticed in Bot. Sulph., p. 8. The carpels are 3-5, often 4; seeds naked; leaves usually entire.

GOSSYPIUM HARKNESSII. Shrubby, forming rounded clumps 2-3 feet high, with angled branches, glabrous throughout: leaves broadly cordate, often with closed sinus, entire or three lobed near the apex; petioles an inch or more long, equaling the blade: peduncles exceeding the petioles,

jointed nearest the summit: bracts 3, broadly ovate-acuminate, entire, less than half the length of the sulphur-yellow petals: calyx truncate: petals an inch or more long, with purple spot at base: capsule ovate, pointed, 14 mm. long: carpels 3: seeds naked:

This handsome shrub belongs to the section to which the generic names *Thurberia* and *Ingenhouzia* have been given. The specimens were in flower and lacked mature fruit, but fortunately some old empty capsules were yet persistent. It was seen only upon Santa Margarita Island where it is very common, often growing in masses. Named for Dr. H. W. Harkness, President of the California Academy of Sciences, as a tribute to his efforts in furthering the exploration of Lower California.

AYENIA BERLANDIERI Watson.—Comondu.

AYENIA PUSILLA L. Specimens not so strict as those from Sonora, smoother and with more ovate leaves.—Magdalena Bay.

MELOCHIA TOMENTOSA L.—Magdalena Island, Comondu.

GALPHIMIA ANGUSTIFOLIA Benth. var. *OBLONGIFOLIUM* Gray.—Purisima.

HIRÆA MACROPTERA DC.—Comondu, San Ignacio.

VISCAINOA GENICULATA (Kell). These specimens, differing considerably from previous collections, show the species to be very variable, and bring it even closer to *Chitonia* than had been previously supposed. The leaves are either simple or imparipinnate, with 3-5 leaflets: petioles often more than a half-inch in length: flowers ochroleucous. Abundant in some places, and called by the inhabitants, who have a very good idea of its botanical affinities, "guia-can."—San Raimundo, San Fernando.

FAGONIA CALIFORNICA Benth. Leaflets sometimes an inch long, larger than those of Californian specimens.

LARREA MEXICANA Moricand.—Nearly throughout the whole region.

ERODIUM TEXANUM Gray.—Calmali and northward.

ERODIUM CICUTARIUM L'Her.—Magdalena Island. Half a dozen plants recently introduced.

OXALIS WRIGHTII Gray.—El Rancho Viejo.

OXALIS LATIFOLIA HBK.—Identified by Prof. William Trelease, who states that the fruit does not exactly agree with his description.—Magdalena and Santa Margarita Islands, Comondu, Purisima.

PTELEA APTERA Parry.—Las Huevitas.

CNEORIDIUM DUMOSUM Hook.—Las Huevitas.

CASTELA TORTUOSA Liebm. ? Nearest to the description of this species, but perhaps distinct. A tangled, thorny bush 2-3 feet high. The specimens are without flowers.—Magdalena Island.

KOEBERLINIA SPINOSA Zucc. Flowers light yellow.—San Jorge.

BURSERIA HINDSIANA Benth. The number of leaflets varies from one to nine, and it therefore seems hardly necessary to retain the var. *rhoifolium* for three-leaved specimens, as has been done by Engler, in Monog. Burseraceæ, p. 58.—Magdalena and Santa Margarita Islands, Comondu, San Gregorio. "Copal."

BURSERIA MICROPHYLLA Gray. A small aromatic bush or tree.—Magdalena and Santa Margarita Islands.

BURSERIA ODORATA. A bush or small tree 6-10 feet high, trunk 4-6 inches in diameter, glabrous, with smooth bark: leaves crowded at the ends of the branchlets, odd pinnate with three pairs of leaflets: leaves little more than an inch long; rachis barely margined; leaflets sessile, oblong ovate, acuminate or obtuse, entire, midvein prominent, 14 mm.

long, 6 mm. wide: fruit angular-globose, 4 to 6 mm. in diameter on a recurved pedicel of the same length; nutlet bright yellow.—Common at San Gregorio, Purisima, Comondu. The bark of *Bursera* is used for tanning hides, and the different species are generally known as “torote.”

SCHÆPFIA CALIFORNICA. A bush 8–10 feet high, with rigid divaricate branches, the young ones and leaves minutely pubescent, older branches white-fissured: leaves fasciated on short branches that are scaly from the scars of detached leaves, oblanceolate or spatulate, tapering to the base, leathery, glaucous, faintly 3-nerved beneath, usually vertical by a twist at the base: perianth reddish-yellow, 6–8 mm. long, somewhat saccate at base and narrowed above at the staminal attachment, 4–5 angled with as many recurved lobes one-third as long as the tube: stamens broad as long, equal in number to the lobes of the perianth and opposite to them, sessile on the throat, which is pubescent just above the point of attachment: ovary somewhat sulcate, conical at the tip, terminating in a style less than half the length of the corolla tube: stigma obscurely 2-lobed, about 8-angled: ovules two, pendant from the summit of the ovary, the upper portion of which is covered with a thick, spongy, yellowish disk, perforated for the passage of the pistil and flat on the upper surface, but conformed to the conical ovary on the lower: fruit oval, 6 mm. long, the bony covering of the seed under the somewhat fleshy calyx marked with darker longitudinally-sulcate lines and reticulations: embryo solitary, linear, about half the length of the ovary, at the apex of copious albumen; radicle superior.—San Gregorio and Comondu.

VITIS, sp. Only flowering specimens could be found so early in the season, and they seem to belong to *V. Californica* rather than to *V. Arizonica*.—Not uncommon in damp cañons of the south about Comondu and Purisima.

RHUS INTEGRIFOLIA Benth. & Hook.—El Rosario.

RHUS AROMATICA Ait. var. *INDIVISA* Watson.—El Rancho Viejo.

RHUS DIVERSILOBA Torr. & Gray.—Very abundant about El Rosario and in a form resembling *R. toxicodendron* from El Rancho Viejo.

RHUS LAURINA Nutt.—San Jose de Gracia and northward.

VEATCHIA DISCOLOR (Benth.). *Schinus ? discolor* Benth. Bot. Sulph. 11, t. ix; Walp. Rep., v. 413. *Rhus Veatchii* Kell. Proc. Cal. Acad., ii, 24; Hesperian with plate, April, 1860; Engler, Monog. Burseraceæ 59. *Veatchia Cedrosensis* Gray., Bull. Cal. Acad., i, 4; Proc. Am. Acad., xx, 291; Pittonia, i, 198, 201. *Bursera pubescens* Watson, Proc. Am. Acad., xxiv, 44. Dioecious, arborescent, 10–25 feet in height, 1–2 feet in diameter, with low tortuous widely-spreading branches: leaves, pedicels, peduncles and young shoots appressed-pubescent, upper surface of the leaves only sparsely so: leaves fascicled, imparipinnate, 1–3 inches long, with 1–7 pairs of sessile leaflets, entire or variously lobed, the upper ones often confluent with the 3–7 lobed terminal one: panicles axillary and more or less terminal, compound, often ample, when in full bloom completely covering the nearly, at that time, leafless tree: inflorescence short-hirsute, flowers 4 mm. long: sepals 5, concave, valvate: petals twice as long as the sepals, ovate-acute, somewhat accrescent, conduplicate, keeled by the strong mid-nerve: stamens of the female flower minute, abortive: styles 3, capitate, indistinctly so in the male flower: ovary oblique, flattened, pubescent; half-grown fruit red, nearly equaling the petals: disk of five separate lobes, sometimes crenate or deeply bilobed, sometimes oblong, entire, with 10 stamens alternately inserted in front and in the sinus, or ten-crenate with all the stamens inserted into the intervals: aestivation quincuncial. The forming fruit is thin-walled, otherwise it resembles very much that of *Rhus ovata*. The flowers are either bright pink or yellowish gray, but the

different colors are on different trees, and have no relation to their sex. The calyx is usually of a deeper tint.—Magdalena and Santa Margarita Islands, San Pablo, and northward nearly to San Fernando. Known locally as "Copalquien."

The genus differs from *Rhus* in its valvate sepals, accrescent petals and thin-walled fruit. It is a somewhat singular circumstance, considering its wide distribution and the fact that its bark is exported for tanning, that mature fruit is still unknown. Only flowering specimens were to be found from January to the end of April. On Magdalena Island, early in January, some trees blossomed while in full leaf, but all the flowers withered without forming fruit, and were probably out of season. The figure in Bot. Sulph. was drawn from a branch blooming in this way.

The first allusion to *Veatchia* of which I have any knowledge is found in Mr. Hinds' introduction to the Botany of the Sulphur, p. 5, where he says: "I have also seen some attempts at trees; imagine what the bones and muscles of a giant would be distorted into three feet, such looked these trees. They twisted and twirled, but could not assume the erect position. Their diameters were far from inconsiderable."

The description given by Dr. John A. Veatch* in the

* "The Elephant Tree is one of the curiosities of Cerros Island. It derives its name from the elephantine proportions of its sturdy, heavy looking trunk and branches. The main trunk of a full-grown tree will probably average two feet in diameter, the height being but little more, and often less than the diameter. In some favorable situations I observed a few that reached an elevation of six feet; this was, however, an unusual occurrence. The trunk divides into several ponderous branches that shoot off horizontally, and are bent and contracted into grotesque resemblances of the flexed limbs of a corpulent human being. These huge branches often terminate suddenly in a few short twigs, covered with a profusion of red flowers, reminding one of the proboscis of an elephant holding a nosegay. The resemblance is heightened by the peculiar brown, skin-like epidermis that forms the outer bark, which splits and peels off annually, accommodating the increase of growth.

Hesperian, April, 1860, is not without interest, though his dimensions are somewhat larger than those of any subsequent observer. It must be remembered that these descriptions apply to trees growing in poor soil and exposed to the sharp sea-winds.

DODONÆA VISCOSA L. "Grenadina." Not common.—Jesus Maria, San Pablo.

CARDIOSPERMUM HALICACABUM HBK. Plants glabrous throughout; not uncommon on the mainland in the south.—San Gregorio, Comodu.

CARDIOSPERMUM TORTUOSUM Benth, Not seen upon the mainland.—Magdalena Island.

This epidermis, when removed, exposes the smooth, greenish-colored surface of the spongy inner bark, which is from one to two inches in thickness. When this bark is cut through, a milky juice exudes, that soon hardens into a compact mass of gum and resin. The quantity furnished from a single cut is considerable. Whether the exuded matter be of any value I have had no means of testing as yet; but as the tree belongs to a natural order that furnishes our most valuable and expensive gum-resinous products, it is not improbable that it may prove worthy of attention in that regard. The wood is light and porous and soon decays, and is not likely to be of any economical utility.

"The branches of the larger trees often shoot out to a horizontal distance of twenty feet from the trunk, thus covering an area of forty feet in diameter. Smaller subordinate limbs spring upwards from the upper side of the large boughs, and in this way give a neat oval appearance to the outline of the tree. When loaded with its bright red flowers, the effect is strikingly beautiful, particularly where hundreds of the trees stand near each other, intertwining their huge boughs, and forbidding ingress to the mysterious space they cover and protect. The leaves are minute, and fall off before the blooms are fairly developed. The young tree looks a good deal like a huge radish protruding from the ground, with but a slight root and a few twig like branches expanding from the top.

"On the mountain sides, from a little above the sea-shore to an elevation of fifteen hundred feet, these trees grow scatteringly, singly and in small clumps; but in the narrow vales of the ravines, they sometimes form groves of several acres in extent, presenting the impenetrable and compact form above described. From June till August seems to be their blooming season. It is to be regretted that none of the ripe seeds could be procured during my visit to Cerros."

ÆSCULUS PARBYI Gray.—El Rosario.

MAYTENUS PHYLLANTHOIDES Benth. "Mangle dulce."—Very abundant upon Santa Margarita Island, and common along the shores of the lagoons to San Jorge. A small tree, 10-15 feet high, furnishing wood for fuel.

The following Rhamnaceæ were identified by Prof. William Trelease:

ZIZYPHUS OBTUSIFOLIA Gray.—San Gregorio, Comondu.

ZIZYPHUS PARBYI Torr.—Las Huevitas.

CONDALIA SPATHULATA Gray.—Purisima, San Luis.

CONDALIA MEXICANA Schl. ?—A small tree in San Julio Cañon.

RHAMNUS CROCEA Nutt. The leaves are similar to the island forms.—San Sebastian.

SAGERETIA WRIGHTII Watson.—El Rancho Viejo.

COLUBRINA GLABRA Watson.—Magdalena Island, San Julio Cañon.

ADOLPHIA CALIFORNICA Watson.—San Fernando, Agua Dulce.

LUPINUS AFFINIS Agh.—Comondu.

LUPINUS MICRANTHUS Dougl. More white-villous than usual.—San Sebastian.

LUPINUS, sp. Apparently a distinct species.—Santa Margarita Island.

LUPINUS ALBICAULIS Dougl.—Santa Maria.

LUPINUS, sp. The same as Palmer's No. 708 from San Quintin.—San Borgia, San Ignacio, El Rosario.

MEDICAGO DENTICULATA Willd.—Comondu.

MELILOTUS PARVIFLORA Desf.—Introduced into several southern localities.

TRIFOLIUM TRIDENTATUM Lindl.—Growing upon the high mesas near San Enrique.

TRIFOLIUM MACRÆI Hook. & Arn.—With the preceding species.

HOSACKIA RIGIDA Benth.—San Enrique, Calmalli, San Luis.

HOSACKIA BRYANTI. Perennial, silky-villous, stems a foot or two long, branching, decumbent: leaflets 3 or 5, linear-oblongate, 14–18 mm. long: peduncles 3–4 inches long, much exceeding the leaves: stipules inconspicuous glands: umbel 3–4 flowered, subtended often by a single leaflet: flowers 14–18 mm. long: petals pale rose-color: calyx one-third as long, the lanceolate teeth about equaling the tube: pod 2 mm. wide, 2–3 inches long, straight.—A handsome species growing on the sand of Magdalena and Santa Margarita Islands, and along the banks of the lagoon to San Jorge. Named for Mr. Walter E. Bryant, who first collected it in 1888.—Easily distinguished from *H. rigida* by its decumbent spreading habit, its larger, handsome, different colored flowers and the longer, narrower pods.

HOSACKIA PLEBEIA. Perennial, silky-pubescent throughout: stems spreading, less than a foot in length: leaflets 3–6, on a winged rachis, obovate, mucronate, 8–10 mm. long: peduncles three times the length of the leaves: flowers solitary or geminate, yellow, 6–8 mm. long: calyx half as long, teeth acuminate, shorter than the tube: pod curved, 10–12 seeded: stipules and bracts reduced to a mere gland: seeds smooth.—El Rancho Viejo.

HOSACKIA MARITIMA Nutt.—San Esteban.

HOSACKIA PARVIFLORA Benth.—Patrocinia, Santa Maria.

HOSACKIA STRIGOSA Nutt.—San Sebastian.

HOSACKIA SUBPINNATA T. & G.—San Enrique.

HOSACKIA GLABRA Torr.—San Pablo.

HOSACKIA PROSTRATA Nutt.—Socorro, San Quintin.

HOSACKIA MICRANTHA Nutt.—San Pablo, San Sebastian, El Rancho Viejo.

*DALEA CANESCENS** Benth.—Prostrate: flowers deep purple: stamens 10: style very long, stigma not capitate.

DALEA DIVARICATA Benth. In this species, as well as the very closely related *D. Parryi*, the second ovule is often so early and completely aborted that it escapes all except the most careful search. If only the herbaceous stems had been collected, it might easily have been mistaken for an annual, but it is a perennial with a woody base. The vexillum is reniform and glandular, the anthers bear a large gland at the apex.—Magdalena Island.

DALEA PARRYI T. & G.—Santa Margarita Island, Patrocinia, Agua Dulce.

DALEA, sp. Near *D. Parryi* but with longer leaflets and somewhat longer calyx teeth. Apparently annual.—San Enrique, San Julian.

DALEA CHRYSORRHIZA Gray. The specimens are old, but are evidently of this species with fewer leaflets and larger heads. The flowers are very shortly pedicellate; the very

*A revision of *Dalea* by some one having access to the original specimens is becoming a necessity. Many of the early descriptions are so brief that it is difficult to distinguish allied species by them, and the anomaly of identical names by different authors for different species adds to the confusion. As for instance: Martens & Galeotti in Bull. Acad. Brux. X, No. 7, 40, and soon after Bentham in Bot. Sulph. described four different species under the names *canescens* and *ramosissima*. In the Index of N. A. Botany, *D. canescens* and *ramosissima* are credited to Bentham and a reference is given to Walp. Rep. ii, 513. This is probably a typographical error in Dr. Watson's invaluable work, and is perhaps meant for p. 855 instead, for on that page are found the names, but they are for the species of Martens & Galeotti. Mr. Hemsley, in Biolog. Cent.-Am., makes no reference to the flora of Baja California escaping thereby the necessity of noting *D. canescens*, and reduces *D. ramosissima*, Mart. & Gal., to a synonym of *D. diffusa*.

caducous bracts and upper end of the minute pedicel are furnished with a pair of the singular fusiform stipular glands described by Dr. Gray.—Cardon Grande.

DALEA VETULA. Annual, erect, less than a foot high, glabrous except the ovate, dense inflorescence: leaves 20–30 mm. long: leaflets 21–25, 2 mm. long, stipitate, oval, retuse except the ovate-lanceolate terminal one: calyx 3–4 mm. long, the teeth linear-lanceolate, three or four times as long as the tube, long-villous with spreading silvery hairs, glands between the ribs long-linear: bracts ovate, long-acuminate: peduncles somewhat exceeding the leaves: keel, wings and standard nearly equal in length, 2 mm. long, dark purple, included in the calyx: anthers short, with large gland: ovary glandular, sparsely pubescent, 2-ovuled: pod not filled by the solitary compressed seed.—Comondu, San Gregorio.

DALEA EVANESCENS. Annual, silky pubescent, spreading: stems 3–8 inches long: heads 12 mm. long, terminating the slender branches, or rarely with one or two lateral: leaves less than an inch long: leaflets three or four pairs, minutely glandular dotted, 2 mm. long, cuneate-obovate, retuse: stipules small, reddish, subulate: calyx less than 2 mm. long, with large glands, teeth purplish, acuminate, shorter than the somewhat scarious tube, slightly unequal: corolla light rose color, 2 mm. long, slightly exceeding the calyx: anthers broader than long, furnished with a very large gland: bracts purplish, ovate-lanceolate, shorter than the calyx: ovary broad, covered with very large glands, sparingly pubescent, the second ovule very soon aborted: pod filled by the seed.—A small annual species, nearly prostrate, having few stems and heads and scattered leaves, collected near San Ignacio.

DALEA RAMOSISSIMA Benth. Vexillum cordate-ovate, with rather broad claw: corolla deep violet.—Magdalena Island.

DALEA SEEMANNI Watson.—San Esteban.

DALEA FORMOSA Torr. The specimens differ from the type in having only 3-7 oval or elliptical entire leaflets, the stipellar glands blunt instead of acute, and slight pubescence on the leaves, petioles and young shoots.—San Esteban.

DALEA EMORYI Gray. In these specimens the foliage and pubescence of the species appears to be remarkably variable. The plant from El Campo Aleman is densely lanate throughout, that from San Luis approaches the ordinary form, while that from Santa Maria has become glabrous on all exposed parts excepting the inflorescence. The leaves of all, though varying much in size, have the same prolonged terminal leaflet, which in the upper leaves is the only one.—Cajon de Santa Maria, San Luis, El Campo Aleman.

DALEA TINCTORIA. Perennial, decumbent or prostrate spreading, branching stems 2-3 feet long, pubescent with spreading hairs or almost glabrous, covered, except the upper surface, by small prominent orange-colored glands: leaves 1-2 inches long, leaflets, 3-5 pairs, cuneate-obovate or oblanceolate, crenate, sometimes retuse, 5-10 mm. long, the terminal leaflet much longer and narrower; stipules minute: peduncles exceeding the leaves: heads rather densely flowered, ovate to cylindrical, 10-25 mm. long: bracts narrowly ovate, shorter than the calyx: calyx 3 mm. long, lobes nearly equal, triangular, acute, one-third as long as the tube: corolla violet, vexillum slightly longer than the calyx, the keel a third longer: anthers with an orange gland at apex: ovary pubescent, glandular: pod filled by the single seed.—Very abundant in some localities, staining the legs of animals yellow.—San Gregorio.

DALEA TINCTORIA var. **ARENARIA.** Nearly glabrous, stems soft herbaceous: leaflets fewer, narrow and remote, the terminal lobe frequently more than half the leaf: peduncles 3-5 inches long: heads larger and more pubescent: calyx lobes slightly more acuminate.—Sands of the sea-shore,

Boca de Soledad.—This plant differs much in appearance from the species to which it is referred, but it seems best not to separate it specifically on purely vegetative characters.

DALEA MEGACARPA Watson.—San Julian, Calamujet.

DALEA BENTHAMII. *Dalea* ? Bot. Sulph., p. 12. To the excellent description of the vegetative characters given by Mr. Bentham, little need be added. The subulate almost spinose stipules are at first gland-tipped, and the larger terminal leaflet usually retuse: bracts slender, gland-tipped, one-third the length of the calyx: calyx veiny, pubescent, teeth obtuse, shorter than the tube, nearly equal in length: petals pale yellow, retuse, blade shorter than the claw, staminal tube even: anthers not glandular: style three times the length of the ovary, glandless: pod 1-seeded, exceeding the calyx, tipped by the nearly as long, persistent style: embryo green or yellow, very variable.—Santa Margarita Island.—This species differs from *D. megacarpa* in the entire leaflets, veiny almost rugose on the upper surface, in its divaricate branching habit, more spinose stipules, shape of the petals and in the very much longer glandless style.—The embryo furnishes a useful lesson as to the slight diagnostic value of a character ordinarily constant in species. From the same plant, they are either deep or yellowish green, oblong or nearly round. The cordate base is produced irregularly, the radicle appearing to be sometimes at the base, sometimes at the side. The lobes often become curved appendages on the sides, the cotyledons may be folded one over the other in various ways and are sometimes three in number.

DALEA SCHOTTII Torr.—Cajon de Santa Maria.

DALEA SPINOSA Gray.—A small tree or bush growing in the sand of dry streams at Calamujet.

EYSENHARDTIA SPINOSA Engelm. Leaves larger than those of Pringle's Chihuahua specimens.—Paraiso.

INDIGOFERA ANIL L.—Purisima.

TEPHROSIA PURISIMÆ. Perennial, decumbent, appressed silky pubescent, stems a foot or two long: stipules triangular-lanceolate, spinose: leaflets 3-6 pairs, linear, mucronate by the prolongation of the mid-rib, strongly and rather remotely veined, an inch or less in length, the rachis two or more inches long: racemes elongated: flowers pedicellate, solitary or in pairs, light pink with darker banner, 14 mm. long: calyx 6 mm. long, teeth equal in length to the tube: pod narrow, 13-15 seeded, two or more inches long, beaked by the long style. — Much resembling specimens of *T. Palmeri*, but having a different habit, flowers of another color and smaller seeds, without an evident aril. — San Gregorio, Purisima, Cardon Grande.

OLNEYA TESOTA Gray. "Uña de gato." — Comondu to Calamujet.

ASTRAGALUS NUTTALLIANUS DC. — San Jorge, San Esteban.

ASTRAGALUS HORNII Gray. — San Quintin and a form from San Gregorio and San Jorge perennial about the lake and annual in depressions of the flats which differs from the San Quintin plant in having smaller pods and leaflets.

ASTRAGALUS CANDIDISSIMUS (Benth.) Hairs of the calyx usually nearly black. Prostrate on the sandy ocean side of Magdalena Island, and erect in depressions among the dunes of Santa Margarita Island.

ASTRAGALUS LEUCOPSIS T. & G. — El Rosario.

ASTRAGALUS OOCARPUS Gray. ? — San Fernando.

ASTRAGALUS TRIFLORUS Gray. — Llano de San Julian.

ASTRAGALUS ORCUTTIANUS Watson. — San Enrique, San Borgia and apparently the same species in flower only, from San Gregorio.

ASTRAGALUS sp. Too near specimens of *Phaca Berteriana* Moris. — San Julio.

ÆSCHYNOMENE NIVEA. Shrubby, branches short and few, erect, 2-3 feet high, hoary somewhat strigose-pubescent: leaves 1-1½ inches long, lighter green above: leaflets 10-18 pairs, broadly linear acuminate, 4-6 mm. long: flowers axillary, solitary or rarely two or three in a very short raceme: peduncles bristly hairy, longer than the flowers: calyx 2 mm. long, teeth broad, triangular, ciliate on the margins, all but the lowest shorter than the tube, the two upper united nearly to the tip: corolla ochroleucous, more than twice as long as the calyx: ovary stipitate, pubescent; legume somewhat pubescent, reticulate-veiny, segments 1 or 2, rounded.—Purisima.

VICIA EXIGUA Nutt.—San Esteban, San Julio.

LATHYRUS VESTITUS Nutt.—El Rancho Viejo.

PHASEOLUS FILIFORMIS Benth. Leaves very variable.—Magdalena and Santa Margarita Islands and Comondu.

PHASEOLUS ATROPURPUREUS DC. var. *SERICEUS* Gray.—Comondu, San Ignacio.

GALACTIA, sp.—Comondu.

RHYNCHOSIA PHASEOLOIDES DC.—Comondu.

RHYNCHOSIA, sp. Near *R. minima*.—Comondu.

RHYNCHOSIA, sp. "Frijolita." Near the preceding, but more pubescent, and not twining.—Comondu.

CÆSALPINIA PANNOSA. Shrubby, 2-4 feet high, branches slender, clothed with white deciduous bark, at first pubescent with white spreading hairs intermixed with sparse stipitate glands: pinnæ 1-2 pairs and an odd one: rachis slender, 1-3 inches long: leaflets 2-3 pairs, oblong or obovate, retuse, 3-12 mm. long: peduncles pubescent, 2-4 inches long; pedicels slender, jointed below the middle: bracts ovate-acuminate: calyx tube hardly oblique, lobes oblong, obtuse, pubescent but not glandular: petals slightly exceeding the 6 mm. long calyx, pale yellow, claw very

short, glandless, blade covered, except a narrow thin border with sessile ruby-red glands: stamens 10, curved at summit and inserted outside the margin of a 5-lobed disk, one usually imperfect or abortive, anthers oval, obtuse: stigma contracted at apex; ovary nearly glabrous, densely glandular; ovules 3: pod falcate, one and a half inches long, half inch broad, glabrous and glandular, 1-2 seeded: seeds 8 mm. long, somewhat flattened and oblique, with thin margins. Near *C. Palmeri*, from which it differs principally in its much larger leaflets and in the construction of the flower, which in the latter has pedicels jointed above the middle: calyx tube very oblique, disk apparently continuous with the stamens, petals with longer claws margined by stipitate glands, all glands yellowish, anthers strongly apiculate and stigma dilated at the summit.—San Jorge, Comondu.

HOFFMANSEGGIA INTRICATA. Suffrutescent, in clumps 1½ feet high, intricately branched, the branches becoming rigid, glabrous: leaves with a single pair of pinnae and a terminal one, each bearing 8-10 leaflets less than a line in length: calyx hardly pubescent: racemes lateral, 6-8 flowered: pod glandular.—El Campo Aleman and northward nearly to Calamujuet. This appears to be *H. microphylla* Torr. var. *glabra* Watson, Palmer's No. 543 from Los Angeles Bay, but *H. microphylla* is upright in growth, 2-3 feet high, with wand-like stems bearing 20 or more flowers, very pubescent and glandular, and the terminal pinna two or three times longer than the lateral ones.

HOFFMANSEGGIA STRICTA Benth.—Santa Margarita Island, San Gregorio, San Fernando.

HOFFMANSEGGIA MICROPHYLLA Torr.—Calamujuet.

PARKINSONIA ACULEATA L.—San Gregorio to Calamujuet and San Fernando.

PARKINSONIA MICROPHYLLA Torr.—Calamujuet.

PARKINSONIA FLORIDA (Benth.) Probably this species, but the material is very scanty. The young branches are pubescent, leaflets 5-8 mm. long, and pods often somewhat falcate.—San Raimundo, San Gregorio.

CASSIA COVESII Gray.—San Gregorio.

CASSIA OCCIDENTALIS L. A small bush growing about a dwelling, and probably not native.

PROSOPIS PALMERI Watson. "Palo de hierro." A small tree, 10 feet high, with spreading top, dark roughened bark and a trunk 6-10 inches in diameter: legumes pubescent, 2-3 inches long, half-inch wide, slightly curved, 8-12 seeded: immature seeds slightly flattened, oblong, reticulated, cotyledons yellow, with a triangular notch at base filled by the short rhomboidal radicle.—Abundant on the high, rocky mesas near Purisima and Comondu.

PROSOPIS JULIFLORA DC.—San Gregorio to San Fernando.

DESMANTHUS VIRGATUS Willd. The plant so named by Bentham in Bot. Sulph. It is commonly a small bush, sometimes on ocean slopes prostrated by the wind, and rarely, in favorable localities, assuming a tree-like form, and reaching a height of five feet. Concave glands are found often between all the pinnæ but sometimes only between the lowest ones. The legumes are 1-3 inches long, 6 mm. wide, seeds flattened, smooth, nearly orbicular, attached by a very slender tortuous funicle and marked on each side by a semi-circular line.—Magdalena and Santa Margarita Islands.

DESMANTHUS, sp. Near the preceding, glabrous, virgate, 2 feet high, seeds covered with a loose gray scurf, and marked by a semi-circular line as in the preceding: legumes 3-4 inches long, straight, 6 mm. wide.—Comondu.

MIMOSA, sp.—Purisima.

MIMOSA, sp.—A small bush neither in flower nor fruit, common on Santa Margarita Island.

ACACIA FARNESIANA Willd.—Pozo Grande.

ACACIA WRIGHTII Benth.—Paraiso.

ACACIA, sp.—San Benito.

ACACIA, sp.—Comondu.

ACACIA, sp. A common bush; apparently undescribed.—San Gregorio, Comondu.

ACACIA, sp. “Palo friorro.” A thorny bush with small bipinnate leaves and an abundance of curved, rough, black legumes an inch broad and three inches long.—San Gregorio.

LYSILOMA CANDIDA. A small tree, growing to a height of twenty-five feet, usually with several trunks from a single root: bark smooth, white, but dark on the small branches, glabrous except the inflorescence: leaves 3-7 cm. long: pinnæ one or rarely two pairs, with a small, prominent gland between the lower: leaflets 4-7 pairs, narrowly or broadly oblong, obtuse or retuse, 8-15 mm. long, the pinnate veins continued to the margin: stipules leaf-like, oblong, oblique, 6-15 mm. long: bracts small, caducous: flowers capitate, the heads pedunculate in short racemes or clusters, bracteoles similar to but shorter than the calyx lobes: calyx 3 mm. long: corolla one-half longer, its lobes as well as those of the calyx pubescent and thickened at the tip: stamens 40-50, yellow, twice as long as, and united at base into a tube half the length of the petals: anthers transversely oblong, separating into about four pollen masses: ovary nearly sessile, glabrous: style cylindrical, equaling the stamens: pod on a short stipe, 8-15 cm. long, 25-30 mm. wide, smooth, reddish-brown, thin and almost papyraceous, 8-15 seeded, thickened on the edges by the stout nerves which separate more or less completely, and often persist as red-brown threads

upon the tree, valves tardily separating from about the seeds, which are oval, smooth, flattened, 6-10 mm. long, transversely attached by long, slender funicles: radicle very short, covered by the downward prolongation of the cotyledons. It appears to be very distinct from *L. microphylla* of Los Angeles Bay and Cape San Lucas, and is well known in the region about Purisima and Comodu by the name "palo blanco." The bark is excellent for tanning hides, and most of the wine of the country being made in these hides, receives a somewhat disagreeable flavor from the "palo blanco" and "torote."

CALLIANDRA CALIFORNICA Benth. A spreading bush, 2-4 feet high, with dark green leaves and large, showy crimson flowers.—Magdalena and Santa Margarita Islands to San Borgia.

PRUNUS FREMONTI Watson.—El Rancho Viejo.

PRUNUS ILCIFOLIUS Walp.—Growing in San Julio Cañon to a tree having a trunk a foot and more in diameter and to a height of fifteen feet; exactly in its Santa Cruz Island form. On the mesas northward it is a common bush.

ADENOSTOMA FASCICULATA H. & A.—El Rosario.

VAUQUELINIA TORREYI Watson.—El Rancho Viejo, Paraiso.

ROSA MINUTIFOLIA Engelm.—El Rosario.

RIBES TORTUOSUM Benth. ? Probably this species, but as the description was drawn from the plant in flower before the leaves appeared, the determination is uncertain. In all the comparisons that can be made between fruiting plants in full leaf and flowering leafless ones, they agree. The lobes of the calyx (attached to the mature fruit) are quite variable in length compared with the tube, sometimes agreeing perfectly with the description but often of equal length. The leaves of the same length as the pubescent pedicles are somewhat reniform, nearly glabrous, 5-lobed, doubly crenate, the largest more than 2 inches in breadth and

1½ inches in length. The fruit is red, 1-5 seeded.—San Julio, Las Huevitas.

RIBES LEPTANTHUM Gray. A form of this species with smaller flowers and shorter calyx lobes.—El Rancho Viejo.

TILLEA MINIMA Miers.—Magdalena Island, San Jorge.

COTYLEDON ATTENUATA Watson.—Las Huevitas, San Quintin.

COTYLEDON PULVERULENTA Benth. & Hook.—San Benito and northward.

COTYLEDON EDULIS Brewer.—Leaves of a species resembling this on Magdalena and Santa Margarita Islands.

COTYLEDON, sp.—Calmalli.

COTYLEDON RUBENS. Slightly pulverulent, nearly acaulescent: leaves 2-3 inches long, lanceolate, one-half inch wide at base: stems 4-6 inches high: bracts few, auriculate-clasping, broadly linear, acuminate: inflorescence a small panicle, 2-3 inches long: pedicels shorter than the flowers: calyx teeth broadly lanceolate, longer than the tube: corolla dull red, contracted at mouth, with lobes one-third the length of the tube.—A small species growing on cliffs near San Esteban.

RHIZOPHORA MANGLE L. "Mangle."—Covers large areas of shallow water about Magdalena and Santa Margarita Islands and along the lagoons to San Jorge. It does not grow about the San Gregorio Lagoon.

AMMANNIA LATIFOLIA L.—Comondu

LYTHRUM ALATUM L. var. *LINEARIFOLIUM* Gray.—Cajon de Santa Maria.

LYTHRUM BRYANTI. Annual, glabrous, a foot high or less, branching freely: leaves alternate, broadly linear or somewhat lanceolate, narrowed at the base, about as long as the internodes; stipules minute: flowers usually solitary: ped-

icels 1-3 mm. long, bracteate in the middle: calyx clavate, conspicuously nerved, teeth broad, more conspicuous than the intermediate processes: petals purple, 3-4 lines long, oblong-ovate: stamens 12 in two sets, the longer ones opposite the calyx teeth: ovary embraced by a thickened ring; style as long as ovary: seed smooth, ovate, flattened. A handsome species, first collected by Walter E. Bryant.—Comondu, San Jorge.

ZAUSCHNERIA CALIFORNICA Presl.—Santa Maria.

JUSSIEA OCTONERVIA Lam.—Comondu, Purisima.

EULOBUS CALIFORNICUS Nutt.—Comondu.

CENOTHERA SCEPTROSTIGMA. Annual, low and spreading, somewhat appressed-pubescent: leaves narrowly lanceolate in outline, 2-4 inches long, irregularly cleft nearly to the mid-rib into numerous slender, sometimes lobed segments: flowers sessile, as long as the leaves: throat of the calyx 4 mm. long, funnellform, orange-colored, closed at the base: petals an inch long, bright yellow: ovary ridged, 2-3 inches long, tapering from the base, the upper half closed as in *Taraxia*, but bearing abortive ovules to the summit: stigma cylindrical, much longer than the oblong anthers.—Very showy and fragrant, opening its flowers at nine or ten o'clock in the morning; and covering with a bright carpet large portions of the sandy soil along the southern coast. In damper situations it sends out lateral stems several inches in length.—San Gregorio, February.—Collected also by Dr. Edward Palmer at Lagoon Head, March 6-15, and recognized as a new species by Dr. Vasey and Mr. Rose, who, however, on the receipt of named specimens from the writer, courteously adopted the MS. name there given.

CENOTHERA TRICHOCALYX Nutt.—El Rosario.

CENOTHERA TRILOBA Nutt.—Water-holes, San Julio, San Jorge.

ÆNOTHERA CÆSPITOSA Nutt. var. Leaves finely divided and villous.—El Campo Aleman.

ÆNOTHERA CHEIRANTHIFOLIA Hornem.—Socorro.

ÆNOTHERA BISTORTA Hornem.—San Borgia.

ÆNOTHERA MICRANTHA Hornem.—El Campo Aleman.

ÆNOTHERA CHAM.ENERIOIDES Gray.—El Llaño de Santana.

ÆNOTHERA CRASSIFOLIA Greene.—Magdalena Island, Socorro.

ÆNOTHERA ROSEA Ait. Very variable, sometimes strongly 4-winged, apex long-attenuate or nearly obtuse.

ÆNOTHERA REFRACTA Watson.—Calmalli, Cardon Grande.

ÆNOTHERA SCAPOIDEA Nutt.—Calamujet.

ÆNOTHERA CARDIOPHYLLA Torr.—San José de Gracia, Santa Maria.

GODETIA EPILOBIOIDES Watson.—San Enrique.

HAUYA ARBOREA (Kell.) These specimens, brought from the mountain ranges east from Cedros Island, have herbaceous stems 2-3 feet high, the leaves are lanceolate, thin, sparingly pubescent and denticulate, often 2 inches in length: anthers yellow (in specimens where they are rose-colored they are possibly stained by the petals), apiculate. The style is not tortuous, as in all the specimens previously collected.—San Pablo.

LOPEZIA CLAVATA. (Plate IV.) Annual, slender, 1-2 feet high, almost glabrous: leaves ovate, alternate, $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, coarsely serrate, with petioles in the lower ones nearly an inch long, gradually reduced above to sessile bracts: flowers scattered, on long peduncles: anterior sepal free, the three posterior united one-third their length, and covered for that distance by a semi-circular yellow disk: petals unequal, the two anterior larger, broadly obovate tapering to a narrow base, the posterior shorter and strap-

shaped, attached to the border of the semi-circular disk: anthers two, the posterior large, fertile, extrorse, the anterior petaloid, nearly equal in length, slightly exceeding the pistil which it embraces: filament about as long as the anther: stigma dilated, cup-shaped; ovary clavate, 6–10 mm. long, 4-celled: capsule opening at the top by four loculicidal teeth: seeds numerous, clavate-oblong, minutely scabrous, ventrally attached below the middle, apex downward.—Base of Cliffs, Comondu Cañon.

Baillon in *Histoire des Plants*, vol. vi, unites with *Lopezia* both *Semeiandra* and *Riesenbachia*, and his views are strengthened especially in regard to the last genus, by this species, the fruit of which is almost exactly that of Presl's figure. The flower, however, is that of *Lopezia*, and less irregular than the typical species explains in a measure their structure. "The claws of the posterior petals glandular at the apex," being here united as a semicircular disk adnate to three of the sepals, are plainly to be regarded as a modification of the disk which in many of the *Onagraceæ* lines the calyx-tube. The stamens show none of the tendency to unite in a tube about the pistil, which in some of the species approaches them to *Semeiandra*.

GAURA, sp. Three feet high, annual: leaves broadly-lanceolate, repandly toothed or entire, pubescent.—Gardens of Comondu.

GONGYLOCARPUS FRUTICULOSUS (Benth.). (Plate v). *G. frutescens* Curran, Proc. Cal. Acad., Ser. 2, i. *Gaura? fruticulosa* Benth., Bot. Sulph. 15; Walp. Rep. v, 670. Mr. Bentham considered the remarkable method of fruiting in this, as well as in the allied species, to be the result of injury or disease—an opinion which, it is needless to say, can no longer be held. The fruit certainly persists for many years; how long it is difficult to determine. Dead plants retain in the woody envelopes apparently all the seed ever perfected. The small spreading or decumbent bushes are 2–3 feet high in

the center, and bear a profusion of showy flowers.—Seen only upon Magdalena and Santa Margarita Islands.

PETALONYX THURBERI Gray.—Common in the sand of dry streams about Calamujet.

PETALONYX LINEARIS Greene.—San Gregorio, Santa Maria.

EUCNIDE CORDATA Kellogg.—San Gregorio.

EUCNIDE URENS Parry.—Santa Maria.

MENTZELIA ADHERENS Benth.—Magdalena Island.

MENTZELIA DISPERSA Watson.—San Pablo.

MENTZELIA HIRSUTISSIMA Watson. Plants sparingly hirsute, all the upper leaves sessile: seeds large, white, oval, turgid and rugose, in two rows on each placenta.—Calamujet, Cajon de Santa Maria.

SYMPETALEIA AUREA Gray. Flowers either pale yellow or deep orange.—Pozo Grande, Comondu, Purisima.

SYMPETALEIA RUPESTRIS (Baill). San Julio Cañon and Cajon de Santa Maria.

PASSIFLORA FETIDA L.—Magdalena Island, Comondu and northward to Calmalli.

ECHINOCYSTIS MINIMA (Kellogg). The leaves of this plant are extremely variable, even for a family of plants in which variation is not uncommon. They may be a half-inch or more than three inches long, deeply 5-lobed with slender segments or perfectly entire.—Santa Margarita Island, Comondu.

CYCLANTHERA MONOSPERMA. Perennial (?), climbing in bushes to a height of five feet, glabrous, very slender: leaves small on short petioles, divided nearly to the base into 3–5 linear segments: tendrils slender, elongated, simple; peduncles of the male flowers two cm. long; raceme half as long, flowers very small on slender pedicels, three mm. long, jointed close to the flower: calyx tube pateriform, lobes

subulate, very short: corolla lobes divided to the base: stamens connate in a head: female flowers similar to the male, somewhat larger, solitary on short peduncles from the same axil, style very short, stigma hemispherical: ovary with a beak twice its length, 1-celled; ovule one, erect: fruit flattened, oblique, clavate-oblong, 5-7 mm. long with a beak of the same length, not fleshy, sparsely furnished with erect spines: seed conformed to and filling the capsule, which is somewhat 2-horned at the apex.—Agua Dulce.

CUCURBITA PALMATA Watson. Neither flowers nor fruit.—San Fernando.

CUCURBITA CORDATA Watson.—San Gregorio.

CUCURBITA, sp. Probably undescribed, but the material is too meagre.—San Benito.

MAXIMOWICXZIA SONORÆ Watson. Abundant, and with its bright red fruit very showy. The leaves are variable in size and dissection, the seeds seem to be often covered by an aril, underneath which they are coarsely rugose. In one specimen, which seems not to differ from the others, the seeds are larger, pale and perfectly smooth. More abundant collections may show the species to be too closely related.—Magdalena and Santa Margarita Island.

Also collected at Cape St. Lucas in August, 1876, by Mr. W. J. Fisher, who noted that the fruit was bright scarlet.

MAMILLARIA GOODRIGII Scheer. "Llavina." Fruit scarlet, small and pleasant to the taste. Flowers ochroleucous.—Magdalena and Santa Margarita Island, and northward to San Quintin.

MAMILLARIA, sp. Cæspitose, stems a foot or two high, or hanging from the cliffs at Comondu six feet. Fruit insipid to the taste.—San Gregorio, Purisima, to El Campo Aleman.

MAMILLARIA, sp. Rarely proliferous, globular, 4-6 inches in diameter. Flowers pinkish-white, blooming in May.—San Jorge to El Campo Aleman.

MAMILLARIA, sp. Growing in densely caespitose, flattened masses, 2-4 feet in diameter.—San Julio Cañon, San Pablo.

MAMILLARIA HALEI. (Plate VI.) Caespitose, stems 8-10, about a foot high, 2-3 inches in diameter, straight, covered with dark-colored straight spines: tubercles short, rounded, woolly in the axils: spines 15-25, one-half inch long, with 3-4 of the interior ones stouter and an inch long: flowers an inch long, vertical from the axils of young tubercles, scarlet: sepals all scarlet, petaloid: anthers scarlet, filaments exserted yellowish, stigma scarlet: fruit red, clavate, one-half inch long: seeds smooth.—A handsome species, seen only upon Magdalena and Santa Margarita Islands, where it is very abundant.

ECHINOCACTUS WISLIZENI Engelm. "Biznaga." This species is common and variable in Lower California. It sometimes becomes eight feet high. The lateral spines of the specimens collected vary in number from 7 to 12, the flowers are greenish yellow, with a narrow or broad reddish central line upon each petal, or sometimes entirely dull red. The spines are from two to six inches long, and in some localities are all perfectly straight. The fruit is hard and yellow when ripe, acid to the taste, and though not unpleasant, is not eaten by the sugar-loving inhabitants. It blooms in May, while at the same time fruit of different ages may be found on other plants.—San Gregorio and northward.

CEREUS (ECHINOCEREUS), sp. Flowers purple. The plants somewhat resemble *C. gonacanthus*.—San Gregorio to El Campo Aleman.

CEREUS PHENICEUS var. **PACIFICUS** Engelm. West Am. Scientist ii, 46. Probably this species, but without flowers

or fruit. On Magdalena Island dried abortive spiny fruit can be found entangled in the heads. Apparently the same species, less robust, grows on the cliffs of Comondu. It resembles the variable *C. phœniceus* of Colorado.

CEREUS MARITIMUS M. E. Jones.—El Rosario.

CEREUS ENGELMANNI Parry.—High mesas. San Julio, San Pablo.

CEREUS EMORYI Engelm.—Las Huevitas, El Rosario.

CEREUS GUMMOSUS Engelm. Mr. Orcutt informs me that Dr. Engelmann gave the name to this species, and death prevented him from publishing it. This is the "pitahaya" of Southern Lower California, the fruit of which is held in such high esteem. It blossoms in April and ripens its fruit in the fall. The flowers are 4-5 inches long, purple and handsome. The bruised stems are used for stupefying fish.—Throughout the entire region traversed, abundant.

CEREUS COCHAL Orcutt. The color of the plants is rather light green; they are much branched from the base, the spines are short and few, and the flowers small and inconspicuous.—From the high mesas of Comondu to San Fernando.

CEREUS PRINGLEI Watson. "Cardon." Spines sometimes nearly two inches long. It grows to a height of fifty feet, and in some localities forms forests, with the numerous flowers generally growing upon the sun-exposed side. Near the coast, and on Santa Margarita Island fishhawks build their nests upon the top.—Seen throughout the whole region nearly to San Quintin.

CEREUS THURBERI Engelm. "Pitahaya dulce." Begins to bloom in May, and later in the season matures a fine luscious fruit. About Comondu the stems, which grow to a height of fifteen feet, are cut green, and when dry furnish fuel for making sugar "pinoche."—Common northward to San Fernando.

CEREUS SCHOTTII Engelm. Known as "hombre viejo" or "cabeza vieja," so called from the resemblance of the long, fine white spines of the top of the plant to a gray head.—Comondu to San Quintin.

CEREUS ERUCA. (Plate VII.) Prostrate, very rarely branched, 13-ribbed, 3-4 feet long, 3-4 inches in diameter; rooting from the under side of the older growth, decaying at one end and growing forward at the other, generally in patches of 20-30, probably originating from a common center: areolæ 4-6 mm. in diameter, separated about the same distance: spines about 20, stout, ash-colored, less than an inch long, the exterior cylindrical, the interior stouter, angular, somewhat and the lower central one much flattened, more than an inch long, angular, strongly reflexed: flowers and fruit not seen. Common on the sand of Magdalena Island and about San Jorge. Its local name is "chilenola." The manner of growth, with uplifted heads and prominent reflexed spines, gives the plants a resemblance to huge caterpillars. The flowers are said to be yellow.

CEREUS, sp. Small, vine-like, with neither flowers nor fruit.—Santa Margarita and Magdalena Islands.

OPUNTIA (PLATOPUNTIA), sp. Agreeing with the description of *O. chlorotica* excepting as to its fruit. The flowers are yellow or nearly red, the stems densely retrorsely spinose.—Magdalena and Santa Margarita Islands, San Jorge.

OPUNTIA (PLATOPUNTIA), sp. Spines few, joints large, flowers yellow.—Comondu.

OPUNTIA (PLATOPUNTIA), sp.—Comondu cliffs.

OPUNTIA ENGELMANNI Salm. var.—In the northern part of the Peninsula.

OPUNTIA TUNA Mill.—Cultivated at Comondu and Purisima.

OPUNTIA INVICTA. Low, condensed, branching: joints 4

inches long, 2-3 inches thick: exterior radial spines 6-10, interior spines 10-12, 4-angled or flattened, 1-1½ inches long, striate, stout and thick, ash-colored at base, with lighter points: ovary covered with reddish spines: flowers yellow, two inches in diameter: seeds two mm. wide.

The short thick joints and branching habit combine to give this species a strong resemblance to the *Echinocerei*. The plants are about a foot high, covered with the stout thorns and bear an abundance of yellow flowers.—Common about San Juanico and seen northward to El Campo Aleman.

OPUNTIA (CYLINDROPUNTIA), sp. Resembling *O. prolifera*. Flowers purple, fruit proliferous, and maturing many seeds.—Santa Margarita and Magdalena Islands, San Jorge.

OPUNTIA (CYLINDROPUNTIA), sp. Resembling *O. Bigelovii*. Flowers light yellow, stamens green, anthers yellow.—Common at Calamujuet.

OPUNTIA PROLIFERA Engelm. The plants are sometimes almost spineless.—San Ignacio and northward.

OPUNTIA MOLESTA. Stems few and sparingly branched, 4-6 feet high: joints 6-8 inches long, an inch thick: tubercles not prominent, few, bearing 4-6 spines less than a half-inch long; and 1-3 spines 1-2 inches long: pulvillæ of the ovary, 15-20, bearing a few short spines: fruit ovate, an inch long, smooth, juicy: seeds 6 mm. in diameter, rounded, very irregular in shape, deeply and coarsely lobed or tuberculated, not evidently flattened in any direction: flowers purple, two inches in diameter.—The long spines are sometimes not present.—San Ignacio.

OPUNTIA (CYLINDROPUNTIA), sp.—Calmalli.

OPUNTIA (CYLINDROPUNTIA), sp.—Purisima, Comondu.

OPUNTIA, sp. This and the following species are related to *O. leptocaulis*.—Agua Dulce, San Enrique.

OPUNTIA, sp.—San Gregorio.

SESUVIUM PORTULACASTRUM L.—Magdalena Island, San Gregorio.

TRIANTHEMA MONOGYNA L.—San Gregorio.

MOLLUGO CAMBESSIDII Fenzl.

MESEMBRYANTHEMUM CRYSTALLINUM L.—San Benito, Calamujet to El Rosario; common and abundant thence to San Quintin.

ARRACACIA BRANDEGEI Coulter & Rose, *n. sp.* Tall and branching, glabrous: leaves large, twice or thrice ternate, on short petioles with broad inflated sheathing base, the petioles of upper leaves reduced to the sheath; leaflets broadly ovate, coarsely and irregularly serrate, mostly 2 to 3-lobed or even, parted, 2 to 3 in. long: umbel long-peduncled, 8 to 12-rayed, with involucre wanting or a single oval long-acuminate bract, and involucels of numerous long linear bractlets which are broadened at base; rays 4 to 8 in. long: pedicels an inch long: flowers purple; calyx-teeth wanting: stylopodium slender conical, from a very prominent disc: fruit ovate to ovate-oblong, 3 to 5 lines long, glabrous; oil-tubes solitary in the intervals (occasionally replaced by a group of 2 or 3), two on the commissural side.—Magdalena Island, January 28, 1889.

APIASTRUM ANGUSTIFOLIUM Nutt —San Sebastian, San Enrique.

CORIANDRUM SATIVUM L. Escaped from cultivation.—Comondú, Santa Margarita Island.

DAUCUS PUSILLUS Mx.—San Esteban.

LEPTOCAULIS ECHINATUS Nutt.—San Sebastian.

ERYNGIUM sp.—San Jorge.

ARALIA SCOPULORUM. (Plate VIII.) Shrubby, 4-10 feet high, glabrous: leaves pinnate, 3-6 inches long on petioles

1-3 inches long; leaflets 3-7, either petiolate or almost sessile, broadly ovate, somewhat cuneate at base, coarsely serrate, long-acuminate, the upper ones sometimes connate: stipules ciliate, adnate to the expanded base of the petiole, which breaking away leaves the stem marked by the closely-set adherent bases: calyx lobes minute: petals 5-6, imbricate-valvate, triangular-ovate, the apex thickened at the midvein within: anthers short-ovate, equal in number to the petals: disk conical: ovary often 6-celled; fruit 5-6 ribbed: panicle compound: peduncle elongated with few umbels; pedicels numerous, a half inch long, very sparingly scabrous: bracts and bractlets narrowly-lanceolate. The serratures are tipped by often incurved teeth.—Common on the rocks of Comondu Cañon. Collected in March in flower and young fruit.

SAMBUCUS GLAUCA Nutt. ?—El Rancho Viejo.

SAMBUCUS, sp. Introduced about the old missions and ranches. The berries are used as a medicine.—Purisima, Comondu.

HEDYOTIS (EREICOTIS) ASPERULOIDES Benth.—San Gregorio.

HEDYOTIS (EREICOTIS) MUCRONATA Benth. Bot. Sulph. 19.—Magdalena Island. Probably these species, although not agreeing very well with the descriptions. The section *Ereicotis*, to which they were referred, has since been included in the genus *Mallostoma*, Gen. Pl. ii, 60; but as their determination is uncertain, the names are merely copied from Mr. Benthams list.

RANDIA ?, sp. "Papachi."—Comondu. In mature fruit only.

GALIUM STELLATUM Kellogg.—San Borgia, Calamujet.

GALIUM APARINE L. var. *VAILLANTII* Koch.—San Julio.

GALIUM ROTHROCKII Gray.—San Julio Cañon.

TRICHOCORONIS WRIGHTII Gray.—Comondu, in damp places.

HOFMEISTERIA PLURISETA Gray. These specimens from widely-separated localities, although differing much in habit, pubescence, breadth of leaves and even in pappus, hardly warrant separation as species. Those found at Purisima are nearly glabrous, with thin leaves somewhat cordate at base, nearly an inch wide: pappus of 5-6 scabrous awns and as many broad, erose paleæ. The Santa Maria forms are densely pubescent, with leaves often reduced to mere vestiges at the ends of long peduncles and pappus of 8-10 long awns with the intermediate paleæ prolonged into slender bristles. Those from San Ignacio are intermediate in every respect.—Purisima, San Ignacio, Santa Maria.

HOFMEISTERIA FASCICULATA (Benth.) Growing in dense clumps along the seashore. The leaves vary from 3-lobed and one-half inch broad to twice three-parted and five times the size. The paleæ of the pappus are evidently normally five in number, but are sometimes reduced to two or three, in which case they are of unequal width, and can easily be divided.—Magdalena and Santa Margarita Islands.

HOFMEISTERIA PUBESCENS Watson.—Growing in dense clumps among rocks and in cañons.—San Benito.

MALPERIA TENUIS Watson. Apparently this species, although the style tips, somewhat enlarged upwards are more exserted, and the awns and very short paleæ are each five in number. The specimens of this species and of *Hofmeisteria* show that too much reliance must not be placed upon slight distinctions of pappus, and especially on the number of segments into which a paleaceous crown may be divided.—San José de Gracia.

EUPATORIUM, sp. A large shrubby species.—San Julio Cañon.

EUPATORIUM, sp. A shrubby species.—Comondu.

EUPATORIUM, sp.—San Pablo.

BRICKELLIA HASTATA Benth.—Santa Margarita Island.

BRICKELLIA COULTERI Gray.—San Gregorio.

BRICKELLIA FRUTESCENS Gray.—Agua Dulce.

GUTIERREZIA EUTHAMIE T. & G.—San Quintin.

——— var. MICROCEPHALA, Gray. — Agua Dulce.

GREENELLA RAMULOSA Greene. Probably this species, though from the brief description certainty of identification is impossible. It is often two feet high, the clavate heads are not as conspicuously radiate as in the typical species; the flowers of both disk and ray are white, changing to rose-purple; the akenes are 2 mm. long, densely and strongly upward hispid, not glandular; the pappus is multisetulose; in the ray one-quarter and in the disk three-quarters the length of the akene. This plant brings the genus much nearer *Gutierrezia*, of which it has the style tips and receptacle, and some species of which it strongly resembles. Dr. Gray includes it in his subtribe *Heterochromeæ*, but all the flowers in this species, and apparently those of *G. Arizona*, are white.—Llanos de San Julian, San Raimundo.

APLOPAPPUS GRACILIS (Nutt.)—San Sebastian, San Enrique.

APLOPAPPUS SPINULOSUS (Pursh.) Some of the specimens from San Gregorio have leaves with obtuse teeth, and are so glandular that they stain the drying-papers. Possibly they may be *A. arenarius* Benth.—San Gregorio, San Sebastian and northward.

APLOPAPPUS CUNEATUS Gray.—Ubi.

APLOPAPPUS VERNICOSUS. Suffrutescent, growing in clumps, 12–18 inches high, with slender intricate branches, slightly pubescent, becoming glabrous and resinous: leaves 5–10 mm. long, punctate, cuneate-obovate, with 3–5 spinulose lobes and an enlarged base decurrent upon the angled stem

both by the margins and midrib: heads axillary or in small clusters terminating the branches, nearly cylindrical, 5-7 mm. long, with 3-5 ray and as many disk flowers, the upper leaves passing into the outer ciliate-margined and green-tipped bracts: akenes hispid, those of the ray apparently infertile, oblong and twice the length of those of the disk: pappus of numerous sordid, scabrous bristles.—El Rosario.

SOLIDAGO, sp.—Santa Maria.

SOLIDAGO, sp. Only immature specimens of these species of *Solidago* could be found so early in the season.—El Rancho Viejo.

BIGELOVIA DIFFUSA Benth.—Magdalena Island.

BIGELOVIA VENETA Gray. var.—Magdalena Island, Santa Maria.

BIGELOVIA BRACHYLEPIS Gray.—El Rosario.

PSILACTIS CRISPA. A foot high branching from the base, very glandular and leafy: leaves sessile, one half to one and a half inches long, linear oblong, irregularly and incisely dentate, the dentations abruptly mucronate, heads terminating the branches, half an inch high and an inch in breadth; rays about 30, purple: inner involucreal scales with green somewhat spreading tips: corollas fliform, slightly ampliate above: pappus of ray flowers none, of disk flowers numerous bristles shorter than the corolla and of unequal length: akene silky pubescent. —This plant seems to be perennial, and much resembles the *Macharanthera* section of *Aster*.—Alkaline soil San Joaquin, San Ignacio.

ASTER PALMERI Gray (?). Foliage only.—San Gregorio.

ASTER EXILIS Ell.—Comondu.

ASTER SPINOSUS Benth. Very stout and rigid, flowers an inch in diameter. The stout spinose branches are often themselves branched, giving them the appearance of three-pronged spines.—Common about San Gregorio.

ASTER, sp.—San Fernando.

ERIGERON CANADENSIS L.—El Rosario.

ERIGERON DIVERGENS T. & G.—San Julio.

CONYZA COULTERI Gray.—Comondu.

BACCHARIS GLUTINOSA Pers.—San Gregorio, Comondu.

BACCHARIS SAROTHRIDES DC.—San Gregorio.

PLUCHEA SUBDECURRENS Cass. Very glandular.—San Gregorio.

PLUCHEA ODORATA Cass. Abundant and tall about streams.—San Gregorio, Comondu.

PLUCHEA BOREALIS Gray.—San Gregorio.

STYLOCLINE GNAPHALIODES Nutt.—Calmali.

FILAGO ARIZONICA Gray.—San Benito.

GNAPHALIUM SPRENGELII Hook & Arn.—San Gregorio.

GNAPHALIUM PALUSTRE Nutt.—San Jorge.

GNAPHALIUM DECURRENS Ives.—San Sebastian.

PARTHENICE MOLLIS Gray.—San Gregorio, Comondu.

IVA HAYESIANA Gray.—Socorro.

HYMENOCLEA SALSOLA T. & G. —San Ignacio and northward.

FRANSERIA TENUIFOLIA Gray. *F. hispida* Benth. probably answers to one of the more hispid forms.—Santa Margarita Island.

FRANSERIA CAMPHORATA Greene. Reputed to possess medicinal virtues —Abundant throughout the entire southern region.

FRANSERIA MAGDALENÆ. Suffrutescent, a foot or two high, branching, leafy, strigose-puberulent: leaves 2-3 inches long, oval or ovate in outline, pinnatisect nearly to the midrib; the lanceolate segments incisely toothed, the lower

shorter and remote: inflorescence in simple racemes or the few ♀ heads sometimes in short, branching clusters: involucre of the slender-pedicellate, 30-40-flowered ♂ heads broadly campanulate, 5-10-cleft, not surpassing the flowers; paleæ of the receptacle reduced to mere threads: fruiting involucre ovoid, 5 mm. long, 2-flowered armed with subulate, hooked, rather weak spines which are closely aggregated about the very similar but shorter, incurved beaks.—Magdalena Island.

FRANSERIA ACUMINATA. Suffrutescent nearly glabrous, 2 feet high, branching above: leaves mostly alternate, bright green, very sparingly strigose-pubescent, 2-3 inches long, 1-2 inches wide, ovate-lanceolate in outline, divided nearly to the mid-rib into 3-8 pairs of unequal lanceolate-acuminate lobes, the terminal portion long-acuminate: inflorescence racemose-paniculate: involucre of ♂ heads 5-8 dentate, half the length of the few (10-20) flowers; paleæ of the receptacle minute, somewhat clavate: fruiting involucre 5 mm. long, 2-flowered, clavate-ovoid, with few very short incurved spines in two rows, and a single beak.—Purísima.

This species is another of the intermediate forms which too closely connect the genus with *Ambrosia*.

FRANSERIA BRYANTI Curran. Very abundant in some localities.—Santa Margarita Island to Calmalli.

FRANSERIA DUMOSA Gray.—El Llano de Santana.

FRANSERIA DIVARICATA. Suffrutescent, a foot or more high, much branched, younger growth white-pubescent and woolly in the axils: leaves minutely strigose-pubescent, 1-1½ inches long and broad, on petioles of half their length, deeply 3-5-lobed, the lobes doubly and often deeply serrate or dentate, somewhat reniform at base but often decurrent upon the petiole in several short lobes: inflorescence loosely paniculate; terminal (♂) racemes flexuous, heads distant; involucre 20-30-flowered rotate, 5-10-

toothed, not surpassing the flowers; paleæ of the receptacle minute, ciliate sometimes dilated at apex: fruiting involucre 2-flowered, minutely-puberulent, 6-8 mm. armed with about 30 stout subulate, hooked spines, 2 mm. long: beaks 2, stout, nearly equaling the spines.—San Gregorio.

In this, as in several of the other species, it is not uncommon to find more than one pistil from a single cell.

FRANSERIA FLEXUOSA Gray. The specimens collected from San Esteban represent an extreme form of the species. It becomes eight feet high, the leaves are large and much dissected, axils woolly, and the spines of the fruit are either straight or hooked. The involucre of the ♂ heads (30-60-flowered) are rotate, 5-10-cleft, not surpassing the flowers: paleæ of the receptacle linear-acuminate.—San Esteban.

FRANSERIA AMBROSIODES Cav. Growing in clumps eight feet high.—San Gregorio.

FRANSERIA CHENOPODIIFOLIA Benth. The stout spines are rather broadly dilated at base and canaliculate on the upper surface.—In various forms from Magdalena and Santa Margarita Islands to San Fernando.

FRANSERIA ILICIFOLIA Gray. Leaves often 3 inches long and 2 inches broad, all the teeth spinose: ♂ heads few above the ♀, very broadly campanulate: lobes of the about 10-toothed involucre, subulate longer than the tube, much exceeding the numerous (30-60) pubescent flowers: paleæ of the receptacle linear-spathulate, densely woolly-pubescent.—Cajon de Santa Maria.

XANTHIUM STRUMARIUM L.—Growing around water-holes near San Gregorio and Comodu.

HELIOPSIS BUPHTHALMOIDES (Jacq). The specimens from Santa Margarita Island are smaller and less pubescent than the others and have much smaller heads.—Santa Margarita Island, San Gregorio, Comodu.

ECLIPTA ALBA HASSKARL.—Purisima, Comodu.

HELIANTHUS NIVEUS (Benth.) *Encelia nivea* Benth. Bot. Sulph. *Helianthus dealbatus* Gray, Syn. Fl. i, 28 & Supp. 450. Such species as this tend to reconcile botanists to Baillon's sometimes rather sweeping reductions of genera. In some of the specimens in the herbarium of the California Academy of Sciences, which were collected at Ensenada and San Quintin, the pappus consists sometimes of one slender awn, sometimes of two thin paleæ. In these specimens from Santa Margarita Island, the akenes are longer, more silky-pubescent, and the very deciduous pappus consists of two thin, scarious, lanceolate paleæ, with usually two smaller and shorter intermediate ones.

VIGUIERA DELTOIDEA Gray ?—Magdalena Island.

VIGUIERA LACINIATA Gray. —San Enrique.

VIGUIERA SUBINCISA Benth. —Santa Margarita and Magdalena Islands.

VIGUIERA MICROPHYLLA Vasey & Rose. Common. San Raimundo and northward.

VIGUIERA, sp.—Growing in masses 6 feet high, San Gregorio.

VIGUIERA? PURISIMÆ. Stems indurated 2 feet high, branching from a perennial root, rough with rather sparse strigose pubescence: leaves mostly opposite, broadly ovate-acuminate, sinuate or obscurely dentate, callous pointed, $1\frac{1}{2}$ inches long, an inch wide or less, attenuate at base into a petiole of the same length, equally strigose-pubescent upon both sides: heads 2-3 on short peduncles terminating the branches, half-inch high: bracts of the involucre in about 3 series, ovate-lanceolate, callous pointed, gradually decreasing in size to the linear exterior ones, all conspicuously ciliate with soft white hairs: rays neutral, 15-18 mm. long; akenes effete, very narrowly-linear, smooth, triquetrous: paleæ of the receptacle lacerate, the outer row ample, flattened on the back and completely enclosing the akenes;

the inner rows narrow, keeled, only half enclosing their akenes, which are a third shorter than those of the ray: disk akenes linear, 4 angled, somewhat compressed, 2-4 mm. long, somewhat pubescent especially on the alternate angles, sometimes covered with a grayish scurf; in the same head either naked or with a lacerate crown prolonged at one or two of the angles into stout hispid awns continuous with them.—Purissima.

ALVORDIA.

Heads small, sessile, flattened, glomerate, heterogamous; flowers of the ray neutral, of the disk hermaphrodite. Involucre narrow, contracted above; bracts few-seriate, exterior shorter, those of the receptacle embracing the akenes. Anthers minutely auriculate at base. Style branches linear-cuneate with short acute appendages. Akenes oblong, quadrangular, truncate at apex: pappus of 2-4 hispid-paleaceous awns, and twice or thrice as many intermediate, similar and smaller ones. Suffrutescent herb with opposite nearly entire leaves, and pedunculate glomerules at the ends of the branches and from the upper axils.

Named for William Alvord of San Francisco, in recognition of his well known unceasing interest in and efforts for the furtherance of botanical knowledge, especially on the Pacific Coast.

ALVORDIA GLOMERATA. Perennial suffrutescent, 3 or 4 feet high, scabrous: branches slender, spreading: leaves strigose pubescent, remote, ovate-lanceolate, entire or sparingly dentate, 3-nerved, 1-2 inches in length on petioles less than half as long: heads 10-12 mm. long, 3 mm. wide, sessile, closely glomerate at the ends of peduncles 1-2 inches long, each branch usually ending in three glomerules, one terminal and two arising from the axils of the upper pair of leaves: involucre narrow, flattened, contracted above, concave on the inner face; bracts about 6, the exterior shorter, navicular, ciliate, thickened at base, the inner longer, obtuse,

ciliate and somewhat saccate at the tip; paleæ of the receptacle acute enfolding the disk-akenes, the center of the head occupied by a hispid awn which is evidently an abortive scale: flowers yellow, 4 or 5 in a head; rays 1 or 2, broadly-oval, 5-6 mm. long, irregularly 1-3 notched; akenes effete obscurely triangular, very slenderly linear, with a pappus of 3-5 lanceolate paleæ: flowers of the disk 2 or 3, tubular; tube pubescent; akenes clavate-oblong, quadrangular, truncate, pubescent above, shorter than the ray-akenes; pappus of 2-4 lanceolate, hispid, paleaceous awns from the angles of and about as long as the akene, and 6-12 intermediate, shorter and similar, all easily deciduous.—Not uncommon on the elevated mesas about Purisima and Comondu.

The small heads of this peculiar plant are so closely approximated that the outside bracts of those on the circumference frequently simulate an involucre subtending the glomerule, but careful inspection always shows that they are on different planes.

ENCELIA VENTORUM. Perennial, glabrous, much branched from the base, 3-4 feet high, 2-3 inches thick; branches and leaves succulent: leaves crowded at the ends of the branches, linear, 2 mm. wide, 2-3 inches long, with 3-4 linear, sometimes dentate lobes from the upper half: heads numerous, fragrant, with rather small and inconspicuous rays half hidden by the clustered leaves: scales of the involucre ovate-acuminate: paleæ of the receptacle truncate, thickened and pubescent at tip: tube of the neutral ray hirsute and nearly as long as the ligule: style branches acute: anther tips obtuse: akenes awnless, hardly auriculate, margins long-villous.—Common on the narrow strip of sand between the lagoons and the ocean near the Boca de Las Animas.

ENCELIA LACINIATA Vasey & Rose. With ciliate involucreal scales.—San Gregorio.

ENCELIA CALIFORNICA Nutt.—Socorro.

ENCELIA PALMERI Vasey & Rose.—Magdalena Island and San Gregorio.

ENCELIA CONSPERSA Benth.—Magdalena Island.

ENCELIA RADIANIS. Perennial, stems herbaceous, 2 feet high, white-tomentose at the lower nodes, nearly glabrous above: leaves alternate, ovate-acuminate, undulate, 2–3 inches long on petioles $\frac{1}{2}$ their length: inflorescence loosely paniculate nearly naked. Peduncles 3–5 inches long: heads showy, $1\frac{1}{2}$ inches broad: involucre bracts rather narrow, acuminate, beset with soft white hairs, sometimes ciliate: bracts of the receptacle broad, 2–6 notched at apex, the upper two-thirds pubescent: rays broad, 15 mm. long, neutral: anther tips acute: style-branches broadened upward, triangular with 3 apiculations at tip: akenes pubescent on both surfaces, villous on the margins.—San Gregorio.

BIDENS PILOSA L.—Comondu, Socorro.

LEPTOSYNE PARTHENIOIDES (Benth.) The leaves are sometimes very few and narrowly lobed or the upper entire; sometimes much dissected. The rays are variable in number and sometimes wanting, in color varying from lilac-purple to nearly white with darker veins. The outer akenes have a pappus of two short, retrorsely-hispid awns, sometimes reduced to mere vestiges, the inner ones naked and successively narrower; the thickened margin sometimes merely rugose, sometimes dissected. Undoubtedly *L. heterocarpa* Gray, and probably *L. parthenioides*, var. *dissecta* Watson, of Dr. Palmer's collection.—Magdalena Island, Comondu, Purisima.

LEPTOSYNE DISSECTA (Benth.) Perennial, suffrutescent, growing in clumps among rocks; rays 1–6, yellow; akenes smooth or muriculate on the back, the margins either entire or dissected into lobes, the inner face, either with or without a central ridge similar to the margin; in all the

specimens seen without awns. The plant agrees exactly with Bentham's figure but is usually much larger, and so far from being referable to *L. parthenioides* finds its closest and perhaps too near relation in *L. Arizonica*.—Magdalena Island.

LEPTOSYNE DOUGLASH DC.—San Enrique.

HEMIZONIA FASCICULATA T. & G.—Las Huevitas.

LAYIA HETEROTRICHA Hook. & Arn.—San Enrique.

LAYIA PLATYGLOSSA Gray.—El Rosario.

LAYIA GLANDULOSA Hook. & Arn.—San Quintin.

JAUMEA CARNOSA Gray.—San Quintin.

RIDDELLIA COOPERI Gray.—San Luis, San Sebastian, Agua Dulce.

BAILEYA MULTIRADIATA Harv. & Gray.—Agua Dulce.

PERITYLE DELTOIDEA Watson. Probably this species, but the awn often wanting.—Common on Magdalena Island and about Comondu.

PERITYLE PALMERI Watson. Plants larger in every way than the Guaymas specimens: leaves thin, nearly glabrous; akenes compressed below the summit, with a stout subulate awn.—Common on the cliffs at Comondu and Purisima.

PERITYLE CALIFORNICA Benth.—The plants which answer to Bentham's description and come from the same locality, have, as he says, yellow rays, "ex sicco flavæ videnter," and akenes either hispid or smooth in the same head, with a callous margin, a crown of lacerate squamellæ, and the awn, though usually present, often wanting.—Magdalena Island.

PERITYLE FITCHII Torr. This species seems to be considerably confused. Dr. Gray included in it var. *Palmeri* from Guadalupe Island, and also growing abundantly about Santa

Margarita and Magdalena Islands. The akenes of this variety have thin margins, the rays are white, the pappus consists of a slight but evident crown, with occasionally a single, slender, retrorsely-hispid awn. Whether this form can be kept in the species admits of a doubt; but there can be none in the case of *Laphamia peninsularis*, which, described from mere fragments in the Herbarium of the California Academy of Sciences, has now been again collected at Purisima and Comondu, and agrees with the original description of *P. Fitchii*—"Branches of the style tipped with slender and acute, but rather short, appendages. Achenia compressed, usually with two approximate nerves at each margin, which are barely hirsute, terminated by a small disk-shaped rather prominent areola, which is entirely naked, there being no trace of a pappus." (P. R. R. Rep. iv, 100)—better than any other specimens seen.

From the notes here given it would seem possible to separate at least one species, but gradations occur, and forms found at San Gregorio are almost exactly intermediate. It is probable that the range of variation of the species in this genus has been much underestimated.

BÆRIA GRACILIS, Gray.—El Rancho Viejo.

BÆRIA, sp., a very small species.—Socorro.

ERIOPHYLLUM LANOSUM, Gray.—San Luis, Agua Dulce and San Sebastian. The form found at the latter place has the paleæ and awns of nearly the same length and barely distinguishable.

AMBLYOPAPPUS PUSILLUS, Hook & Arn.—From San Enrique across the Peninsula to San Quintin.

PALAFoxia ARENARIA. Perennial, decumbent, fleshy, much branched from an indurated base, branches divaricate, spreading, a foot or more long, pubescent and glandular: leaves densely strigose-pubescent on both sides, linear, obtuse $\frac{3}{4}$ - $1\frac{1}{2}$ inches long, 3-6 mm. wide, narrowed at base

into a short petiole, the lower opposite, the upper alternate: heads few on peduncles 1-2 inches long, from the ends of the branches and the upper axils: involucre of 10-12, linear obtuse scales, 10-12 mm. long, exceeded about $\frac{1}{3}$ by the pale-purple flowers: rays, none: corolla lobes ovate, half as long as the throat, a little longer than the tube: styles hardly thickened upward: akenes linear-clavate 6-8 mm. long; pappus of 2-5, paleæ with broad costate-thickened center not reaching the tip, and as many or more intermediate, similar and shorter ones, the longer $\frac{2}{3}$ the length of the akene.—Growing on the sand strip between the lagoon and the ocean near the Boca de Las Animas.

PALAFOXIA LINEARIS, Lag.—Calmalli.

CHÆNACTIS CARPHOCLINIA, Gray.—Calamujuet, Agua Dulce.

CHÆNACTIS TENUIFOLIA, Nutt.—Agua Dulce.

CHÆNACTIS STEVIODES, Hook & Arn.—San Enrique.

TRICHOPTILIUM INCISUM, Gray.—San Gregorio, Santa Maria.

HELENIUM PUBERULUM, DC.—El Rosario.

POROPHYLLUM TRIDENTATUM, Benth. The involucreal scales are often furnished with three or four glands.—Magdalena and Santa Margarita Islands, San Gregorio.

POROPHYLLUM GRACILE, Benth.—Magdalena Island, San Jorge.

POROPHYLLUM CRASSIFOLIUM, Watson.—Pozo Grande.

NICOLLETIA EDWARDSII, Gray.—San Gregorio, San Sebastian.

DYSODIA POROPHYLLOIDES, Gray.—Calmalli.

DYSODIA ANTHEMIDIFOLIA, Benth.—A showy plant very abundant in sandy soil near the ocean from San Jorge to Calmalli.

HYMENATHERUM PENTACHÆTUM, DC.—San Fernando.

PECTIS PAPPOSA, Gray.—San Gregorio.

PECTIS CANESCENS, HBK. Probably a form of this polymorphous species. The plants are only a few inches high, glabrous, with long-peduncled heads and few setæ on the leaves, which have large sparse marginal glands. The pappus is multisetulose in the disk, 2-auriculate setose in the ray.—Comondu, Purisima.

PECTIS MULTISETA, Benth.—San Gregorio, San Jorge.

COTULA CORONOPIFOLIA, L.—Socorro.

ARTEMISIA CALIFORNICA, Less.—Las Huevitas.

ARTEMISIA, sp. Neither flowers nor fruit could be found. Perhaps a form of *A. Ludoviciana*.—San Pablo.

PEUCEPHYLLUM SCHOTTII, Gray.—Calamujet.

PSATHYOTES RAMOSISSIMA, Gray.—Agua Dulce.

LEPIDOSPARTUM SQUAMATUM, Gray.—El Campo Aleman.

BEBBIA JUNCEA (Benth.) The leaves of these specimens from the original locality are all entire, the outer series of involucre scales broadly ovate and not acuminate, and the pappus nearly equals the flowers.—Magdalena Island.

BEBBIA ATRIPLICIFOLIA (Gray.) An extreme form has leaves 2 inches long by $1\frac{1}{2}$ wide, the flowers usually somewhat surpassing the pappus, and the involucre scales oblong and often acuminate. Between this and *B. juncea* of Magdalena numerous connecting forms are found, and, as Dr. Gray has written, there is probably but one species.—San Gregorio, Comondu.

SENECIO DOUGLASII, DC.—Agua Dulce.

SENECIO LEMMONI, Gray. A form with narrow linear leaves, more wooly in the axils.—San Esteban.

CNICUS NEO-MEXICANUS, Gray.—San Sebastian.

CNICUS, sp. Eight feet high, flowers purple, bracts fimbriate.—Common along the banks of Comondu Creek.

- CNICUS, sp.—San Benito.
- TRIXIS ANGUSTIFOLIA, DC.—Magdalena Island.
- PEREZIA PALMERI, Watson.—Paraiso.
- STEPHANOMERIA VIRGATA, Benth.—El Llano de Santana.
- STEPHANOMERIA RUNCINATA, Nutt.—Calmalli, Calamujet.
- RAFINESQUIA NEO-MEXICANA, Gray.—San Esteban, San Enrique.
- MICROSERIS LINEARIFOLIA, Gray.—San Pablo.
- MALACOTHRIX CLEVELANDI, Gray.—El Rancho Viejo.
- MALACOTHRIX GLABRATA, Gray.—San Sebastian, San Borgia, Cardon Grande.
- MALACOTHRIX COULTERI, Gray.—San Enrique.
- MALACOTHRIX XANTI, Gray.—Santa Margarita Island, Comondu.
- LYGODESMIA EXIGUA, Gray.—El Llano de Santana.
- LACTUCA INTYBACEA, Jacq.—San Jorge, San Gregorio, Comondu.
- SONCHUS TENERRIMUS, L.—San Jorge.
- SONCHUS ASPER, Vill.—Comondu.
- NEMACLADUS RAMOSISSIMUS, Nutt.—Agua Dulce.
- SPECULARIA BIFLORA, Gray.—San Julio Cañon.
- ARCTOSTAPHYLOS BICOLOR (Nutt.)—El Rancho Viejo. Leaves rather broad, only slightly revolute.
- PHOLISMA ARENARIUM, Nutt.—Socorro.
- PLUMBAGO SCANDENS, L.—Purisima.
- STATICE LIMONIUM, L.—San Quintin.
- SAMOLUS EBRACTEATUS, HBK.—San Gregorio. Flowers pink.

SAMOLUS VALERANDI, L.—San Enrique, Las Huevitas.

SIDEROXYLON LEUCOPHYLLUM, Watson.—Cajon de Santa Maria.

BUMELIA, sp.—San Jose de Gracia.

FRAXINUS DIPETALA, Hook & Arn., var. *TRIFOLIATA*, Torr. Las Huevitas.

FRAXINUS PISTACIÆFOLIA, Torr.?—San Benito, San Jose de Gracia. Sometimes a tree 30 feet high.

MENODORA SCOPARIA, Engelm.—El Rancho Viejo, San Julio Cañon.

APOCYNUM CANNABINUM, L.—San Enrique.

VALLESIA DICHOTOMA, Ruiz & Pavon.—San Gregorio. The same as Dr. Palmer's No. 32 from Muleje, with nearly glabrous punctate leaves, very small flowers, and the horny covering of the fruit underneath the sarcocarp, cribose in longitudinal lines, the ribs anastomosing near the apex.

VALLESIA LACINIATA. Shrubby 2-3 feet high with short stiff branches, and light green leaves usually folding in drying: young growth densely, minutely pubescent, nearly glabrous in age: leaves entire oblong-lanceolate, obtuse at base, mucronately acute at apex, rather prominently pinnate-veined: 30-60 mm. long, 15-30 mm. wide, on petioles 5-8 mm. long: stipules and bracts laciniately cleft: peduncles 10-15 mm. long, simple or di-trichotomously once or twice branched; cymes densely 15-25 flowered; pedicels 3-4 mm. long: calyx cleft to the base with ovate-acuminate lobes about 1 mm. long: corolla 12-15 mm. long, the oblong-oval lobes hairy at the base, nearly $\frac{1}{3}$ the length of the tube, which is hairy within: stamens nearly sessile, triangular, apiculate: carpels of the ovary distinct, styles united but easily separable, stigma above the ring-like thickened portion flattened, 2-lobed; ovules 10-15 in each carpel: drupe by abortion usually only one, fleshy, white, oblong-oval 10-12 mm. long;

endocarp in two layers, the inner projecting in ridges through the oblique cribose openings of the outer; testa endosperm and embryo all correspondingly ridged or nodulated: seed attached by a prominent black funiculus above the middle of the ventral face; cotyledons thick, oblong twice as long as the stout radicle.—San Sebastian, Comondu.

PHILIBERTIA LINEARIS (Decaisne). The specimens from the sands of Magdalena Bay exactly agree with the description of *Sarcostemma arenarium*, Bot. Sulph., 34; those from Comondu with leaves auriculate-cordate, 10-20 mm. wide at base, were found climbing high over bushes and hedges.

ASCLEPIAS EROSA Torr.—Agua Dulce.

ASCLEPIAS SUBULATA Decaisne.—San Gregorio, El Rosario.

ASCLEPIAS ALBICANS Watson.—Magdalena Bay, Santa Maria. Woody at base. Leaves in these specimens often in pairs; fleshy appendages between the bases of the hoods hardly lobed.

METASTELMA CALIFORNICUM Benth.—Magdalena Island, Comondu. Woody at base. Scales of the crown nearly twice surpassing the gynostegium. Follicles linear-acuminate, 50-70 mm. long, 5-7 wide. Veins of the leaves either obscure or apparent.

GONOLOBUS HASTULATUS Gray.—San Joaquin, San Ignacio, Calmalli.

GONOLOBUS, sp.—Parisima.

HIMANTOSTEMMA PRINGLEI Gray. Stems woody at base. Leaves often more than an inch long, the lower reniform. Follicles oval, long-acuminate, 60-110 mm. long, 15-20 wide, echinate with long subulate lobes.—Santa Margarita Island.

ROTHROCKIA CORDIFOLIA Gray.—San Sebastian, in fruit only.

LACHNOSTOMA ARIZONICUM Gray.—San Julio Cañon. Climbing high in bushes and in fruit only.

EUSTOMA EXALTATUM Griseb.—San Gregorio.

ERYTHRÆA MUHLENBERGII Griseb.—Socorro, San Benito, San Luis.

ERYTHRÆA VENUSTA Gray.—San Enrique.

ERYTHRÆA DOUGLASII Gray. Flowers white. Las Huevitas.

GILIA SCHOTTII (Torr.)—Calamujet, San Enrique.

GILIA TENUIFOLIA Gray. Some of the forms 2 feet high, rather densely pubescent and nearly all the leaves lobed.—Ubi, or, as it is often called by the Mexicans, Agua Bonita.

GILIA GLORIOSA (Plate IX). Shrubby, densely branched and forming rounded clumps 3–4 feet high, and as broad, glandular-pubescent, strongly spinose from the persistent divaricate leaves, which in the older branches remain as blackened thorns subtending crowded fascicles of much shorter simple acicular ones: principal leaves stout-subulate, an inch long or less, with four remote subulate lobes, the lower near the base, those of the axillary fascicles flattened, acerose, not half as long: flowers on short peduncles from the upper axils: calyx 10–12 mm. long, nearly twice the length of the peduncle, the linear-acerose lobes nearly as long as the tube, which is membranous in the intervals: corolla pale pink, or nearly white, shading into rose-color; tube funnelform, twice as long as the equally-cleft oval, entire lobes, and three times as long as the calyx; filaments attached to the lower third of the tube, naked, straight, exserted; anthers sagittate at base: style shortly 3-lobed, a little shorter than the stamens: ovary many-ovuled.—Ubi.

It would be difficult to exaggerate the beauty of this plant, as it is seen growing in rounded masses, with the many-shaded large blossoms crowded towards the ends of the branches; unfortunately, as it was just coming into

bloom, no seed could be obtained. It appears to be very local, having been observed only during an hour's journey, and not again met with.

GILIA PUNGENS (Torr.)—Ubi.

GILIA PALMERI Watson.—Calmalli.

——— var. More puberulent, leaves often with one or two lobes near the base, and calyx-lobes longer.—Calamujet.

GILIA INCONSPICUA Dougl.—Forms from San Sebastian, San Borgia.

GILIA FLOCCOSA Gray.—Santa Maria, Las Huevitas, Agua Dulce.

GILIA FILIFOLIA Nutt.—San Julio, El Llano de Santana.

GILIA BIGELOVII Gray.—San Sebastian.

NEMOPHILA RACEMOSA Nutt.—San Esteban.

ELLISIA CHRYSANTHEMIFOLIA Benth.—San Esteban, Comondu.

EMMENANTHE PENDULIFLORA Benth.—San Benito, San Esteban.

PHACELIA RAMOSISSIMA Dougl.—El Rancho Viejo.

PHACELIA DISTANS Benth.—El Rosario, Calmalli, San Julio.

PHACELIA HISPIDA Gray.—San Enrique, Paraiso.

PHACELIA PAUCIFLORA Watson. Calyx-lobes not divided to the base, one of them often expanded and 2-3 lobed. Seeds scrobiculate.—San Esteban, San Benito.

PHACELIA PEDICELLATA Gray.—San Luis, San Enrique, San Sebastian.

PHACELIA CRENULATA Torr.—San Joaquin, San Luis, San Fernando.

PHACELIA (*EUPHACELIA*) *SCARIOSA*. Annual, erect, branching from the base, villous-pubescent and glandular: leaves

2-3 inches long, petiolate, pinnately divided into 3-5 ovate-oblong, crenate or incised lobes, the terminal much the largest: racemes open, elongate, often dichotomous; pedicels filiform, villous 3-5 mm. long, deflexed in fruit: calyx villous, 2-3 mm. long, the broadly-obovate lobes cleft to the base, becoming conspicuously enlarged and thin-scarious in fruit: corolla bright blue with white throat, twice as long as the calyx, the rotate limb as long as the throat; appendages uniting below over the filaments, which are moderately exserted: style cleft one-third its length, the lower third and the ovary pubescent; capsule globular, less than half as long as the fruiting calyx: seeds dull, minutely foveo-reticulated, the margins and the central ridge corrugate.—Magdalena Island.

PHACELIA AFFINIS Gray.—El Rancho Viejo.

PHACELIA MICRANTHA Torr.—Paraiso, El Rancho Viejo.

In most of these specimens, there is to be found no trace of transverse folds in the throat. They are, however, otherwise undistinguishable from forms collected in Arizona, and share with them a peculiarity which appears not to have been noticed, and which approaches the species somewhat to ? *Eucrypta* of *Ellisia*, the capsule being lined with a pair of thin conformed placentæ, each of which, in addition to the numerous grub-like seeds borne on the face, has an additional similar one behind it.

NAMA DEMISSUM Gray.—San Gregorio.

NAMA HISPIDUM Gray var.—San Gregorio.

NAMA STENOCARPUM Gray.—Comondu. In the solitary example collected of this rather homely but interesting plant, the filaments are bordered in their lower third by linear appendages which terminate as tooth-like processes above, the 3 or 4 styles are united half their length, and the capsule has as many placentæ as there are styles. The range of the species has been recently extended northward by

Dr. H. E. Hasse, who has collected fine specimens at Santa Monica.

CORDIA PALMERI Watson.—Magdalena Island.

Probably from the locality, the plant mentioned in Bot. Sulph. 37, as apparently identical with the West Indian *C. angustifolia* Rœm. et Schult.

CORDIA GREGGII Torr.—San Ignacio.

TOURNEFORTIA, sp. Weak bush 4-6 ft. high.—Comondu, Purisima.

TOURNEFORTIA, sp. Low branching shrub.—Cliffs of Comondu.

TOURNEFORTIA, sp. Herbaceous velvety-pubescent perennial.—Comondu.

TOURNEFORTIA, sp. Perennial.—Comondu.

HELIOTROPIMUM CURASSAVICUM L.—Magdalena Island and northward.

HELIOTROPIMUM INUNDATUM Swartz.—San Gregorio.

COLDENIA CANESCENS DC.—San Gregorio, Calamujuet.

COLDENIA ANGELICA Watson.—Calamujuet.

HARPAGONELLA PALMERI Gray.—San Esteban, San Julio.

PECTOCARYA LINEARIS DC.—San Esteban.

KRYNITZKIA BARBIGERA Gray.—San Sebastian, San Luis.

KRYNITZKIA RACEMOSA (Watson.)—San Enrique, San Julio Cañon, San Sebastian, Santa Maria.

Maturing all four nutlets but one attached by a much broader base, and much more persistent than the others.

KRYNITZKIA MICRANTHA (Torr.)—San Sebastian.

KRYNITZKIA MARITIMA Greene.—Santa Margarita Island.

KRYNITZKIA MICROMERES Gray.—Magdalena Island.

KRYNITZKIA, sp.—Magdalena Island.

KRYNITZKIA, sp.—Santa Margarita Island, San Ignacio.

AMSINCKIA INTERMEDIA F. & M.—San Julio, San Enrique.

JACQUEMONTIA ABUTILOIDES Benth.—Magdalena Bay, etc.

IPOMÆA AUREA Kell.—Purisima. A woody perennial, covering small trees with a mass of golden bloom. Fruiting calyx 30 mm. long; seeds nearly globose 10 mm. long, covered with dark brown, minute tomentum. Calyx longer than the tube, broadly campanulate, 40–50 mm. long, peduncles long, solitary; bracts remote from the flower.

IPOMÆA BONA-NOX L.—Along the streams at Comondu.

IPOMÆA TRIFIDA Don. var.—Climbing high among the bushes of Comondu Creek.

IPOMÆA, sp.—Comondu.

IPOMÆA, sp.—Comondu.

IPOMÆA JICAMA. Perennial, glabrous, somewhat twining, with numerous slender stems, prostrate or climbing 4–6 feet high in bushes: roots bearing tuberiform juicy swellings 2–4 inches in diameter: leaves ovate-acuminate, cordate at base, entire, angulate or sinuate-dentate, 30 mm. long and broad, on petioles of the same length: peduncles solitary, 20–50 mm. long with a pair of very unequal bracts near the middle: calyx-lobes oblong-ovate, long-apiculate, the inner 15 mm. long, the outer successively shorter: corolla funnel-form, white changing to purple in fading, 60–80 mm. long, the tube a little longer than the calyx: stigma 2-globose, lobulated: capsule 4-seeded, seeds somewhat rounded densely covered with dark brown pubescence.—Magdalena Island, Santa Margarita Island, San Jorge.

EVOLVULUS ALSINOIDES L.—Purisima.

CRESSA CRETICA L.—Magdalena Island, San Gregorio.

CUSCUTA PATENS Benth.—Magdalena Island. Growing on *Bursera Hindsiana*, *Pterostegia macroptera*, etc.

CUSCUTA, sp.—On *Boerhaavia*.—Santa Margarita Island.

CUSCUTA, sp.—On *Eriogonum*.—San Fernando.

CUSCUTA, sp.—On *Astragalus*.—San Jorge, Comondu.

CUSCUTA, sp.—On *Franseria*.—San Pablo.

CUSCUTA, sp.—On *Carlownrightia*.—El Rancho Viejo.

CUSCUTA VEATCHII. Stems slender, branching; scales few and small: flowers few in the clusters, small: calyx narrowly campanulate at base, with ovate-lanceolate lobes: corolla 3 mm. long, twice as long as the calyx, its slender lobes, as well as those of the latter denticulate on the margin and somewhat reflexed-spreading: filaments shorter than the stamens, attached just below the sinus; appendages broad, nearly as long as the tube, fimbriate above: styles 2, short, stout, unequal; stigmas globular; ovules 4, only one apparently ever maturing: seed globular; embryo large, solid, globose, minutely tessellated, with a terete curved appendage (radicle ?) scarcely longer than the diameter of the globular portion; albumen apparently none.—Ubi, San Enrique, Santa Maria.

This very remarkable species of *Cuscuta* grows upon *Veatchia discolor*, and in the interior, where the tree is taller, frequently covers the whole top with a mass of yellow. As the parasite was often 6–8 feet from the ground, with no intermediate growth, it did not seem that it had germinated in the usual way on the earth. Perhaps the very unusual formation of the seed may be intended to furnish support to the infant plant in beginning its growth in a crotch of the tree or a fold of the cracking bark. The specimens were just coming into flower, and the description of the seed is drawn from such as could be obtained from a dried and persisting tangle of the previous year's growth.

NICOTIANA IPOMOPSISFLORA Dunal “Tabaco de coyote.”—San Gregorio.

NICOTIANA CLEVELANDI Gray. "Tabaco de perro."—Magdalena Island, San Fernando.

NICOTIANA GLAUCA Graham.—San Ignacio.

PHYSALIS CRASSIFOLIA Benth. Probably, from the description, the same as *P. glabra*.—Magdalena Island.

PHYSALIS, sp.—Comondu.

PHYSALIS, sp.—Comondu.

PHYSALIS, sp.—Comondu.

PHYSALIS, sp.—Calamujuet, Cajon de Santa Maria.

PHYSALIS, sp.—Calmalli.

PETUNIA PARVIFLORA Juss.—San Gregorio, Comondu, etc.

DATURA DISCOLOR Bernh.—Magdalena Island.

DATURA METELOIDES DC.—Purisima.

LYCIUM RICHII Gray.—San Quintin.

LYCIUM ANDERSONII Gray.—El Llano de Santana.

—— var. PUBESCENS Watson.—Comondu. In fruit only.

LYCIUM, sp.—Magdalena Bay.

LYCIUM, sp.—Magdalena and Santa Margarita Islands.

LYCIUM, sp.—Magdalena and Santa Margarita Islands.

MOHAVEA VISCIDA Gray.—Calamujuet, Cajon de Santa Maria.

ANTIRRHINUM CYATHIFERUM Benth.—Magdalena Island.

ANTIRRHINUM WATSONI, V. & R.—Magdalena and Santa Margarita Islands.

ANTIRRHINUM SUBSESSILE Gray.—Ubi, San Esteban.

ANTIRRHINUM JUNCEUM (Benth.)—San Julio Cañon, Las Huevitas.

PENTSTEMON PALMERI Gray.—San Luis, Agua Dulce. Eight feet high.

PENTSTEMON SPECTABILIS Gray.—Las Huevitas.

PENTSTEMON CLEVELANDI Gray.—Ubi.

MIMULUS PILOSUS (Benth.)—San Ignacio.

MIMULUS FLORIBUNDUS Dougl.—San Ignacio, Comondu, Purisima.

MIMULUS LUTEUS L.—San Pablo, San Sebastian, Santa Maria.

STEMODIA DURANTIFOLIA Swartz.—San Pablo, Jesus Maria, Purisima.

STEMODIA POLYSTACHYA. Suffrutescent, minutely and sparsely glandular-pubescent, dividing near the base into numerous slender, angled stems about a foot high, and branching above: leaves opposite, triangular-ovate in outline, pinnately parted or incised in the manner of *Conobea multifida*, and decurrent into petioles of about the same length: flowers 1-2 in the axils, on slender pedicels of about their own length: lobes of the calyx acuminate, nearly equal, without bracts: corolla purple, with yellowish throat 8-10 mm. long; upper lip emarginate, lobes of the lower denticulate; tube hairy below the insertion of the stamens: anther-cells disjoined and pedicellate; rudiment of the posterior stamen somewhat capitate: ovary ovate-acuminate, a little exceeding the calyx-lobes, septicidal: valves entire; placental column 2-cleft: seeds spiral-striate.—San Gregorio, Comondu.

This plant and *Conobea intermedia*, in which the rudiment of the fifth stamen is also present, though very minute, appear to break down all distinctions between the two genera.

HERPESTIS (MERCADONIA) EXILIS. Annual, glabrous, erect, 3-6 inches high, seldom branching: leaves penninerved, ovate or oblong-lanceolate, 10-15 mm. long, serrate above the

middle and tapering at base into a margined petiole of less than its own length: flowers axillary on slender pedicels 2-4 times as long as the leaves: calyx 5 mm. long, the posterior oblong-lanceolate sepal of the same form and but little longer than the two anterior: corolla yellow, twice the length of the calyx, upper lip entire, pubescent in the throat with glandular hairs: anther cells divergent, the rudiment of the posterior one often present as a minute capitate appendage to the tube: style dilated, barely 2-lobed at apex: valves of the capsule shortly 2-cleft; seeds oblong with a minutely reticulated coat.—San Jorge.

VERONICA PEREGRINA L.—San Julian.

CASTILLEIA FOLIOLOSA Hook & Arn.—El Rancho Viejo.

CASTILLEIA STENANTHA Gray.—Socorro.

CASTILLEIA BRYANTI. Annual, six inches to two feet high, rough-pubescent with spreading hairs: branches from near the base, slender, erect; fruiting spike often much elongated: lower two or three pairs of leaves linear, entire, the succeeding divided into 3-7 long-linear lobes: bracts similar to the upper leaves, their tips and those of the calyx usually red or ochroleucous: calyx cleft half way, about equally before and behind, the lobes cleft either shortly or for nearly a third of their length into lanceolate segments: corolla about equaling the calyx, 15-18 mm. long; galea less than a third as long as the tube; the lower lip with 3 short incurved lobes: stamens 2, 3 or 4 in the same plant: capsule oblong-oval, half as long as the calyx: seeds minute, the diaphanous coat rather close.—San Jorge, San Esteban.

ORTHOCARPUS PURPURASCENS var. PALMERI Gray.—San Enrique.

CORDYLANTHUS MARITIMUS Nutt.—San Quintin.

CORDYLANTHUS ORCUTTIANUS Gray.—Las Huevitas.

APHYLLON CALIFORNICUM (Cham. & Schl.)—El Rosario

APHYLLON COOPERI Gray.—Purísima, El Rancho Viejo.

TECOMA STANS Juss.—Comondu.

CHILOPSIS SALIGNA Don.—Calamujet.

MARTYNIA ALTHEÆFOLIA Benth.—Magdalena Island.

MARTYNIA ——— ? A single specimen, perhaps a depauperate form of *M. fragrans* Lindl.—Purísima.

ELYTRARIA TRIDENTATA Vahl.—Purísima, Comondu.

RUELLIA, sp. Same as Palmer's No. 196 from Guaymas.—Comondu, San Gregorio.

RUELLIA, sp.—Comondu.

BELOPERONE CALIFORNICA Benth.—Magdalena Bay. Lobes of the lower lip very short; lower side of the throat rugose-veiny; tube near the base furnished with two prominent hispid appendages formed by the confluence of two converging veins, and taking the place of the posterior stamens: retinacula broad, obtuse, often denticulate: seeds smooth, nearly globular; cotyledons nearly hemispherical, the inner surface veined, radicle strongly incurved.—Magdalena and Santa Margarita Islands.

The flowers in these specimens are all pedicellate, but otherwise differ very slightly from Bentham's description, and Ensign McCormick, of U. S. S. Albatross, collected this year specimens at Cape St. Lucas, the original locality, which agree exactly with it, and they, as well as the Magdalena forms, have globular, smooth seeds. Our specimens from Southern California are too young, but if Dr. Gray (Syn. Fl. ii. pt. i, 329) is not in error in describing the seeds as "turgid," "coarsely rugose," they must belong to a different species. The upper anther seems not in any of the forms to be ever truly muticous, but only less calcarate than the lower.

——— var. CONFERTA. Branches whitish, with downward appressed pubescence: leaves ovate-lanceolate, 20–40 mm. long, light-green, glabrate, veiny below, more or less upon short petioles: inflorescence of short axillary racemes, sometimes of solitary flowers: bracts and bracteoles foliose oblanceolate, the latter a third longer than the calyx, which is deeply cleft into 5 lanceolate-acuminate, equal lobes: corolla red, 25–35 mm. long, the narrow tube rather inconspicuously appendaged at base, about the length of the bilabiate limb; upper lip very shortly 2-lobed; the somewhat spreading lower lip rugose-veiny in the throat and divided for one-third its length into oblong lobes: stamens adnate to the tube nearly its whole length; anthers oblique, the upper nearly muticous, the lower shortly calcarate: style filiform; stigma not enlarged; ovules 4; young seeds apparently turgid, smooth.—San Julio Cañon.

BELOPERONE HIANS. Suffrutescent, woody at base, with numerous slender branches, pubescent or glabrate: leaves ovate, oval or oblong, acute or obtuse, shortly petiolate: flowers solitary and sessile in the axils: bracts and bracteoles linear, acute, shorter than the calyx, which is deeply 5-parted, 7 mm. long, the linear lobes acute: corolla red, 25–35 mm. long; tube funnelform not appendaged, much shorter than the deeply bilabiate limb; upper lip barely emarginate, the lower cleft for more than a third its length into oblong, widely spreading lobes: filaments adnate to the whole length of the tube; upper cell of the anther a third the larger, both very minutely calcarate and widely spreading at base: style filiform; stigma not enlarged; ovary 4-ovuled: capsule clavate-oblong, about 15 mm. long, the sterile base no longer than the upper part and exceeded by the calyx-lobes: seeds flattened, glabrous, coarsely rugose; cotyledons reniform with the short radicle incurved towards the sinus.—Comondu.

This species might as well and perhaps better be put into *Justicia*, but it so strongly resembles *Beloperone Californica*

as to be taken for a slight variation of it in the first hasty examination of this collection. From the character of its seeds it may even be that a fruiting fragment of it furnished Dr. Gray with the description which was alluded to under the previous species. The order is much in need of a careful revision.

JUSTICIA INSOLITA. Suffrutescent, a foot or more high, with many short, stiff, almost spinose, minutely white-tomentose, branches: leaves oblong-ovate to lanceolate, minutely pubescent or almost glabrous, short-petioled 15-20 mm. long: flowers sessile, scattered: bracts and bractlets linear-acuminate: calyx 7 mm. long, deeply 4-parted, the linear-acuminate segments twice as long as the bractlets: corolla rose-purple, about 20 mm. long, deeply bilabiate, the tube very short and broad, 2-sulcate at base in front, the two deeper posterior ones a little higher; throat ampliate rugose-veined; limb deeply bilabiate, 3 or 4 times longer than the tube, the upper lip galeate, emarginate or very shortly notched, the lower 3-parted into oblong-ovate lobes: stamens inserted in the throat; anthers muriculate on the sides; cells parallel but not even, widely separated by a broad connective; the upper muticous, the lower with a spur of variable length: style filiform; stigma minutely capitate: ovary 4-ovuled: capsule 16-18 mm. long, the sterile portion the longer: seeds flat, oblique at base, densely covered with retrorsely barbed bristles; embryo small in the loose testa; cotyledons oval; radicle short incurved.—San Gregorio.

BERGINIA VIRGATA HARV. Agreeing exactly with the description, as far as can be made out, but if the reference is correct, *Pringleorhynchum lanceolatum* can hardly be specifically distinct.—Purisima.

DIANTHERA SONORÆ Watson ?—Purisima.

CARLOWRIGHTIA CORDIFOLIA Gray ?—San Julio, Comondú.

DICLIPTERA RESUPINATA Juss.—Comondu.

LANTANA CAMARA L.—Comondu.

LIPPIA NODIFLORA Mx.—San Gregorio.

LIPPIA PALMERI Watson.—Magdalena Island.

LIPPIA (*ZAPANIA*) *BARBATA*. Shrubby: leaves pinnate-veined, crenate, round-ovate, obtuse or a little decurrent upon the short petiole, 15-25 mm. long and broad, rugose-veined, soft pubescent beneath, rough-strigose above: peduncles solitary in the axils, stout, short, much exceeded by the oblong heads: bracts silky pubescent, broadly ovate, all distinct, a little shorter than the white (?) corolla: calyx not half as long as the bracts, formed of two, lateral, navicular, acute segments covered with long white hairs, closing over the cohering nutlets and deciduous with them: corolla 7-8 mm. long, bilabiate, the upper lip erect, entire; lower spreading 3-lobed: stamens sessile, nearly equally attached high in the throat: style short: stigma somewhat 2-lobed.

Described from fragments brought for culinary purposes by a Mexican of Comondu from "La Giganta" a neighboring mountain.

LIPPIA FASTIGIATA. Shrubby about a foot high, with numerous slender, fascicled, white-tomentose branches: leaves densely tomentose, sessile, cuneate-lanceolate, and broadly crenate above the middle, usually opposite, but sometimes ternate, 10-20 mm. long, 4-6 wide: peduncles solitary, stout, 2-4 times as long as the leaves; heads hemispherical to oblong, few-flowered; bracts ovate, distinct, calyx much exceeding the bracts; densely covered with short white wool, lobes two, united nearly to the top and truncate: corolla white (?), 5 mm. long, a third longer than the calyx; tube cylindrical; limb bilabiate, the upper lip 2-lobed, the lower 3-cleft, all the lobes crenate: stamens unequally inserted on filaments longer than the

anther; cells somewhat separated and oblique on a dilated connective: pistil very short the style only $\frac{1}{4}$ mm. long, disk-like stigma attached to the front of the upper half, ovules 1 in each cell.

Given to me at San Benito by a Mexican who collected it from some point nearer the Pacific and used it as a tea under the name "Damiana."

VERBENA XUTHA Lehm.—San Enrique, Agua Dulce, San Julio.

VERBENA CILIATA Benth.—Purisima. Leaves broader than usual.

VERBENA, sp.—San Gregorio.

CITHAREXYLUM FLABELLIFORME Watson.—Comondú. Fifth stamen sometimes antheriferous.

AVICENNIA NITIDA Jacq.—Magdalena and Santa Margarita Islands.

HYPTIS, sp.—Santa Margarita and Magdalena Islands. Possibly a form of *H. Emoryi*, with large leaves and very woolly shortly-pedunculate heads—certainly not *H. laniflora* or *H. tephrodes* from the vicinity of Cape St. Lucas.

MENTHA CANADENSIS L. var. *GLABRATA* Benth.—Comondú.

HEDEOMA THYMOIDES var. *OBLONGIFOLIA* Gray.—El Rancho Viejo.

SALVIA COLUMBARÆ Benth.—Paraiso, Cardon Grande.

SALVIA CEDROSENSIS Greene.—Magdalena Island, San Gregorio.

SALVIA (*CALOSPHECE*), sp.—San Pablo.

SALVIA (*HETEROSPHECE*) *CALIFORNICA*. Shrubby, 2-3 feet high, densely white-tomentose, with branching wool: leaves sessile, oblong, 15-25 mm. long, irregularly coarsely dentate or lobed, the lobes somewhat acutely pungent: fruiting spike elongated, interrupted; verticils remote, 4-8 flowered;

bracts ovate-acuminate: calyx campanulate, 6 mm. long, scarcely bilabiate, shortly, acutely and nearly equally 5-toothed, the posterior a little longer: corolla light-blue, 12 mm. long; tube slender, cylindrical; posterior lip 2-cleft, anterior as long as the tube, the lateral lobes much shorter than the triangular-ovate, fimbriate, middle one: connectives free, long-exserted; the lower fork one-third as long as the upper, and terminated by a small antheriferous cell: style filiform, exceeding the stamens, shortly and unequally 2-lobed.—Calmalli, Cardon Grande.

AUDIBERTIA PALMERI Gray.—San Fernando.

AUDIBERTIA POLYSTACHYA Benth.—Agua Dulce, Santa Maria.

TEUCRIUM GLANDULOSUM Kell.—San Jorge, San Julio Cañon.

SALIZARIA MEXICANA Torr.—El Llano de Santana.

MARRUBIUM VULGARE L.—San Julio.

PLANTAGO PATAGONICA Jacq.—San Gregorio.

PLANTAGO VIRGINICA L. var. LONGIFOLIA Gray.—San Julio.

PLANTAGO MAJOR L.—Comondu.

MIRABILIS LEVIS (Benth.)—Smooth at Magdalena Island; very viscid at Patrocinia and San Julio Cañon.

MIRABILIS TENUILOBA Watson.—Common about San Borgia. Very woody at base; flowers white and fragrant.

ALLIONIA INCARNATA L. *A. malacoides* Benth.—Magdalena Island.

ABRONIA GRACILIS Benth. This species is quite distinct from *A. umbellata*. On Magdalena Island it is a showy annual with very fragrant flowers and so abundant as to color the sands.

ABRONIA MARITIMA Nutt.—Magdalena Island.

ABRONIA UMBELLATA Lam.—Small forms growing nearly in the center of the Peninsula, on sandy plains at El Llano de Sautana and Calmalli.

BOERHAAVIA SCANDENS L.—San Gregorio, Comondu.

BOERHAAVIA ERECTA L.—Magdalena Island, San Gregorio. Very common about the islands, and probably the species alluded to by Bentham, Bot. Sulph. 43, as *B. polymorpha*.

BOERHAAVIA VISCOSA Lag.—San Gregorio, Comondu, Patrocinia.

BOERHAAVIA ELONGATA. Perennial (?). Stems slender, 6 feet long or more, much branched, prostrate on the ground or supported by bushes, nearly glabrous, excepting some spreading hairs on the younger branches, somewhat glaucous: leaves thin, cordate-ovate, acuminate, minutely pubescent above, glabrous below, 20–50 mm. on petioles $\frac{1}{4}$ as long: inflorescence pubescent, axillary and terminal, of imperfect simple or forked umbels, 3–6 flowered, on peduncles usually much exceeding the leaves: pedicels very unequal, 3–20 mm. long: perianth white, spreading, 15 mm. wide: fruit clavate-oblong, 5–6 mm. long, $2\frac{1}{2}$ wide, nearly black, with broad mucilaginous glands in 3 or 4 horizontal rows, or sometimes crowded towards the top.—San Pablo, Jesus Maria.

CELOSIA FLORIBUNDA Gray.—Comondu.

AMARANTUS PALMERI Watson.—Magdalena Island.

IRESINE ALTERNIFOLIA Watson.—Magdalena Island. Probably this species, but the flowers apparently hermaphrodite.

CHENOPODIUM ALBUM L.—San Julio.

CHENOPODIUM MURALE.—Magdalena Bay.

MONOLEPIS CHENOPODIODES Moq.—San Enrique.

EUROTIA LANATA (Pursh.)—Agua Dulce.

ATRIPLEX JULACEA Watson.—Alkaline flats, San Gregorio; Socorro.

ATRIPLEX MICROCARPA (Benth.)—San Jose de Gracia.

ATRIPLEX BARCLAYANA (Benth.)—Magdalena Island.

ATRIPLEX CALIFORNICA Moq.—El Rosario.

ATRIPLEX LINEARIS Watson.—San Jorge.

ATRIPLEX CANESCENS (Pursh.)—San Gregorio.

ATRIPLEX MAGDALENÆ. Perennial, dioecious (?) herbaceous, white-furfuraceous, prostrate, with branches 1-2 feet long: leaves thin, all alternate, obovate, apiculate, entire, 1-nerved, 10-20 mm. long, tapering into a short petiole: ♂ flowers not seen: ♀ flowers sessile in clusters, in the upper leafy axils: fruiting bracts rhomboid, somewhat compressed, nearly 4 mm. long, the tips herbaceous, spreading, edges below the lateral angles not margined or toothed, sides not appendiculate: styles nearly equaling the bracts: seed flattened, about 1 mm. long; radicle nearly superior.—Magdalena Island.

ATRIPLEX LURIDA. Monoecious, woody at base, 1-2 feet high, with numerous very slender, reddish branches: leaves sparingly white scurfy, usually opposite or sub-opposite, oval to lanceolate, acute, sharply denticulate or the upper entire, 15-20 mm., tapering into a petiole $\frac{1}{3}$ - $\frac{2}{3}$ as long: ♂ flowers in globose clusters on short, axillary spikes either on different branches or above and sometimes mixed with the ♀; calyx deeply 5-parted, 2 mm. broad: ♀ flower clusters somewhat scattered in naked panicles, fruiting bracts shortly pedicellate, triangular, rounded above, 2-3 mm. long, very unequal in width, usually much exceeding the length, the upper half margined by a double row of herbaceous teeth; sides 3-nerved, somewhat muricate: styles a little exserted: seed brown, $\frac{3}{4}$ mm. long; radicle nearly superior.—San Gregorio.

ATRIplex CURVIDENS. Shrubby, 4-6 feet high, forming rounded clumps; branches slender, divaricately spreading; leaves linear-spatulate, cuneate, nearly sessile, 15-25 mm. long, 3-5 wide: ♀ flowers paniced; bracts thin, compressed, nearly sessile, triangular, cuneate below, truncate above, about 3 mm long and often nearly twice as broad; the upper margin cleft into numerous linear, somewhat curved segments; sides somewhat appendaged with one or more similar processes: seeds light-brown, flattened, somewhat triangular, nearly 1 mm. long, exceeding the width; radicle superior.—Comondu.

Described from old fruit of the previous year.

SPIROSTACHYS OCCIDENTALIS Watson.—Magdalena Island.

SALICORNIA AMBIGUA Michx.—Magdalena Island. Dioecious, forming bushes.

SALICORNIA HERBACEA L.—Magdalena Island.

SUEDA TORREYANA Watson.—Santa Margarita Island. Ten feet high.

SUEDA OCCIDENTALIS Watson (?).—Magdalena Island.

STEGNOSPERMA HALIMIFOLIA Benth.—San Gregorio.

PHALOTHAMNUS SPINESCENS Gray.—Comondu.

ERIOGONUM FASCICULATUM Benth.—El Pozo Aleman.

ERIOGONUM FASTIGIATUM Parry.—El Rosario.

ERIOGONUM ORCUTTIANUM Watson.—Paraiso.

ERIOGONUM ABERTIANUM Torr.—San Enrique.

ERIOGONUM GRACILE Benth.—San Fernando.

ERIOGONUM ELONGATUM Benth.—San Julio Cañon.

ERIOGONUM ANGULOSUM Benth.—Agua Dulce.

ERIOGONUM THOMASII Torr.—Cajon de Santa Maria.

ERIOGONUM THURBERI Torr.—Cardon Grande.

ERIOGONUM RENIFORME Torr.—Cajon de Santa Maria.

ERIOGONUM INSIGNE Watson.—Cajon de Santa Maria.

ERIOGONUM TAXIFOLIUM Greene—Ubi.

ERIOGONUM IRRETITUM. Perennial, glaucous and nearly glabrous, 1-2 feet high, woody at base and rough, with remains of the clasping petioles; branches numerous, slender, drooping, often fascicled in the axils, divaricate and entangled: leaves all near the base, ovate, acute, 15-20 mm. long, tapering into petioles broadly dilated and clasping at the base and 2-3 times their length; both leaves and petioles sparingly hirsute and ciliate, the latter somewhat scabrous: bracts linear-acuminate, sparingly ciliate: involucre glabrous, $1\frac{1}{2}$ mm. long, solitary, on slender peduncles 3-10 mm. long, in the axils or along the branchlets, clavate, cleft half-way into 3-5 acuminate, somewhat pungent lobes, 3-5-flowered; bractlets in a single series, ovate, hyaline, ciliate, much shorter than the involucre: flowers red, as long as the involucre, developed successively, exserted; segments of the perianth obtuse, pubescent externally, the outer thick, the inner dilated and petaloid on the margins: stamens exserted; anthers oblong: ovary (immature) glabrous.—Agua Dulce.

This is another of the intermediate species which lessens the distance between *Eriogonum* and *Oxytheca*.

ERIOGONUM, sp.—San Borgia.

ERIOGONUM, sp.—Cardon Grande.

ERIOGONUM, sp.—San Juanico.

ERIOGONUM, sp.—Plains of San Julian.

CHORIZANTHE RIGIDA T. & G.—El Pozo Aleman.

CHORIZANTHE CORRUGATA T. & G.—Cajon de Santa Maria.

CHORIZANTHE FLAVA. Branching from near the base, 2-18 inches long, floccose-tomentose or glabrate; the short plants

erect, the longer prostrate; stems yellowish-red: leaves all radical, tomentose on both sides, oblong-lanceolate, tapering into a longer petiole: bracts linear-acuminate and pungent: involucre scattered, spreading; tube nearly cylindrical, tomentose, 4-5 mm. long, at length much surpassed by three broad, somewhat recurved, subequal, straight-awned lobes, tomentose above, near the base; the intermediate ones nearly obsolete: perianth yellow, glabrous, shortly stipitate, exerted $\frac{1}{3}$ its length; segments ovate-acuminate, entire or crenate on the margins, less than $\frac{1}{3}$ the length of the tube: stamens 9, attached near the base of the tube; filaments glabrous, exerted; anthers oblong: ovary nearly as long as the tube: embryo straight, linear; radicle $\frac{1}{3}$ as long as the cotyledons.—Calmalli.

CHORIZANTHE MUTABILIS. Branching at the base, erect or procumbent, 3-12 inches long: stems stramineous, reddish or pale: leaves all near the base, lanceolate, tapering into the petiole: bracts linear-acerose, soft: involucre solitary or in short spikes in the axils; tube slightly pubescent, ribbed, divided above into 3, broad, spreading, somewhat corrugated, shortly awn-tipped lobes, at length flattened and much exceeding the tube, and three intermediate, very much smaller and shorter, sometimes almost obsolete ones: perianth shortly pedicellate, 6-7 mm. long; tube and throat yellow: segments half as long as the tube, white or rose-color, long-hairy on the back, oblong, obtuse, crenate or entire, undulate: stamens 9, attached near the base, about as long as the tube: filaments glabrous; anthers oblong: akene as long as the tube; embryo linear, cotyledons nearly twice as long as the radicle.—San Enrique.

CHORIZANTHE PULCHELLA. Erect or decumbent, 2-12 inches long; branches pale or reddish, flexuous, di- or trichotomously branching: leaves all radical, white-tomentose, ovate, acute, abruptly tapering at base into the 2-3 times as long, margined petiole: bracts slender, spreading, acerose, minute: involucre loosely scattered along the

branches; tube cylindrical, white-tomentose, 5-6 mm. long, equaled or at length much exceeded by three broad, recurved, somewhat uncinat lobes, the three intermediate ones scarcely surpassing the membranous margin which unites the larger: perianth glabrous, shortly pedicellate, 10-12 mm. long; tube and throat yellow; segments rose-color, oval or broadly oblong, deeply cleft at the top and sides into numerous strap-shaped lobes: stamens 9, exerted; filaments glabrous, attached near the base of the tube, the upper third dark red; anthers small, oval: akene $\frac{1}{2}$ the length of the tube; embryo linear; the cotyledons nearly twice as long as the radicle.—San Sebastian.

The large, widely spreading flowers with yellow throat, sharply contrasting with the rose-colored, deeply fringed border, make this the handsomest of all the species.

——— var. ? Bracts broader, awns of the involucre straight; flowers smaller, white, less deeply lobed.—San Luis.

NEMACAULIS NUTTALLII Benth.—San Borgia.

LASTARRIÆA CHILENSIS Remy.—Ascension.

PTEROSTEGIA DRYMARIOIDES F. & M.—San Julio Cañon.

PTEROSTEGIA MACROPTERA Benth. Bot. Sulph.—Magdalena Island, San Quintin.

POLYGONUM NODOSUM Pers.—Comondu.

RUMEX SALICIFOLIUS Weinm.—San Jorge, Comondu.

RUMEX HYMENOSEPALUS Torr.

ANTIGONON LEPTOPUS H. & A.—Comondu, Purisima.

ARISTOLOCHIA BREVIPES Benth. var. ACUMINATA Watson.—Purisima, Comondu.

ANEMOPSIS CALIFORNICA Hook.—Comondu.

LORANTHUS SONORÆ Watson.—Santa Margarita Island, growing on *Bursera microphylla*.

PHORADENDRON CALIFORNICUM Nutt.—San Gregorio.

PHORADENDRON FLAVESCENS Nutt.—El Rancho Viejo.

PHORADENDRON, sp.—Magdalena Island, on *Veatchia*, *Bursera*, etc.

PARIETARIA DEBILIS Forst.—Magdalena Bay, San Julio.

CELTIS RETICULATA Torr.—San Julio Cañon.

CELTIS PALLIDA Torr.—Comondu.

QUERCUS PUNGENS Liebm. ?—San Julio Cañon. Without fruit.

SALIX BONPLANDIANA Kunth. var. *PALLIDA* Anders.—Purísima.

SALIX LONGIFOLIA Muhl.—Santa Maria.

SALIX LASIOLEPIS Benth.—El Rosario.

For the identification of the above willows I am indebted to the kindness of Mr. M. S. Bebb.

POPULUS FREMONTI var. *WISLIZENI* Watson.—Introduced at Purísima and Comondu, but perhaps indigenous at San Enrique.

EPHEDRA NEVADENSIS Watson.—Magdalena Island, Calmalli.

JUNIPERUS CALIFORNICA Carr.—Agua Dulce.

PINUS, sp.—Observed at a distance, on a mountain summit, ten miles south of Calamujet.

EPIPACTIS GIGANTEA Dougl.—San Jose de Gracia.

TILLANDSIA RECURVATA Pursh.—San Gregorio, Comondu.

SISYRINCHIUM BELLUM Watson.—Santa Maria.

ZEPHYRANTHES ARENICOLA. Bulb ovoid, 20–30 mm. in diameter; coats dark colored, shining, marked with darker longitudinal lines, converging and anastomosing near the neck, which equals it in length: leaves 5–8, thick, channeled

down the face, grass green, 2-4 mm. wide, contemporary with the flowers and equaling or surpassing the peduncle, which is rather stout, 6-8 inches long, 4-5 mm. thick, purple at base: spathe rose-colored, not quite as long as the pedicel, 30 mm. long, bifid more than half-way down into lanceolate segments: perianth erect, about 30 mm. long, white, yellowish at base within, tips of outer segments purplish: tube 2 mm. long, with a sparsely hairy ring at top; segments lanceolate, acute, the inner broader: stamens attached below the hairy ring in the throat, about half as long as the perianth: style $\frac{2}{3}$ the length of perianth; the lobes of the stigma 5 mm. long: capsule about 10 mm. in diameter.—Magdalena and Santa Margarita Islands.

Described from cultivated specimens, the plants in their native habitat being long past bloom in January.

AGAVE (EUAGAVE) MARGARITÆ (Plate X). Acaulescent: leaves 40-50, in a dense rosette, 4-6 inches long, the outer ones nearly as broad, the inner narrower, all concave, the pungent terminal spine about 30 mm. long, continued along the edge of the leaf for about the same distance as a dark, horny border, the falcate or deflexed prickles 4-8 on each side of the leaf, 4-8 mm. long: peduncle erect, 8-12 feet high including the $\frac{1}{2}$ as long panicle; branches 6-12, ascending, 6 inches long or less, rather few-flowered: flowers light yellow; triangular lobes 10-15 mm. long, a little exceeding the tube: stamens adnate to the base of the lobes, and about twice their length: style tubular, 3-lobed, a little exceeding the stamens: capsule somewhat clavate-trigonal, constricted near the middle, 30-50 mm. long, 8-12 wide: seeds 3-4 mm. in diameter, smooth.

Very abundant upon Magdalena and Santa Margarita Islands, but not seen upon the mainland. The flowers were filled to overflowing with nectar, which was often seen running down the stem.

AGAVE (EUAGAVE) SOBRIA. Acaulescent: leaves about 20, glaucous, lanceolate, about 2 feet long, narrowed from near the middle, long-acuminate; terminal spine not decurrent upon the margin; prickles brownish, hoary, 8–10 mm. long, 20–40 mm. distant, straight or curved in various directions: peduncle, including the panicle, 15 feet high or less, curved in the larger plants, lower bracts 10 inches long, spine-tipped: panicle 4 feet long, with 10–15 short divaricate branches, bearing dense clusters of light greenish-yellow flowers: perianth 25–30 mm. long, the tube not a fourth the length of the oblong-linear segments: stamens adnate nearly to the top of the tube, nearly twice as long as the perianth: style shortly 3-lobed at apex: old capsules of the preceding year 50 mm. long, 15–20 mm. wide.—Comondu on the mesas.—One of the species which the inhabitants say is not good for making “mescal.”

AGAVE (EUAGAVE) AUREA. Acaulescent: leaves lanceolate-acuminate, curved outward; terminal spine 20–30 mm. long, stout, subulate, decurrent upon the leaf for about the same distance: teeth rather stout, deltoid, variously curved: peduncle 6–12 feet high, the panicle occupying more than half the length: branches 20–30 divaricate, more or less divided, bearing large and dense clusters of orange-colored flowers: perianth broadly campanulate, 25–30 mm. long, the lanceolate lobes more than twice as long as the teeth: stamens about twice as long as the perianth, adnate to the lower half of the tube: style 3-lobed at apex, at length exceeding the stamens: capsule very minutely roughened, 30–50 mm. long, 12–20 wide: seeds black, very thin, 6 mm. broad, with prominent white margin along the contiguous edges.

This species is well marked by its stout habit, outward-curving leaves, campanulate orange-yellow flowers and small fruit. It is the handsomest species of the Peninsula, and is used for making “mescal.”—Purisima, Comondu.

AGAVE SHAWII Engelm.—Very abundant between El Rosario and San Quintin.

AGAVE, sp. Near *A. Huachuensis* Baker, *Amaryllidaceae*, 171—Very abundant in some localities from Paraiso northward.

AGAVE, sp. Near *A. deserti* Engelm.—Comondu and northward; very abundant.

YUCCA VALIDA (Plate XI). Arborescent, 15–20 feet high, trunks 8 inches to 2 feet or more in diameter, growing in clumps and branching from near the base or higher: leaves thin, smooth, flexible, 6–9 inches long, $\frac{1}{2}$ to $\frac{3}{4}$ -inch wide at the center, tapering to a stout involute spine above, and narrowed to less than half its width above the brown, dilated base, margin separating into slender, whitish, recurved threads; panicle pyramidal, about a foot long, somewhat pubescent: perianth cream-white, 2–2 $\frac{1}{2}$ inches broad on pedicels nearly as long as the segments, which are broadly lanceolate and nearly equal in width: stamens papillose, less than half as long as the segments, about equaling the style, uncinate after maturity; anthers sagittate: ovary oblong, abruptly narrowed to the nearly sessile stigma; ovules thick.

This Yucca is certainly distinct from *Y. baccata*, and does not seem referable to any of its Mexican varieties. It does not begin to bloom until about the middle of May, when *Y. baccata* to the north of it, has already nearly mature fruit. It was observed from San Jorge to San Borgia, and near Patrocinia formed forests miles in extent; the trees in general appearance strikingly like *Y. brevifolia*, though the trunks were much less covered with old reflexed leaves.

YUCCA BACCATA Torr.—Agua Dulce. Trunks ten feet high.

YUCCA WHIPPLEI Torr.—San Julio.

NOLINA BIGELOVII (Torr.)?—Ubi. Too young.

NOLINA, sp.—Paraiso.

NOLINA, sp.—San Julio. Leaves only of an arborescent branching species, 15 feet high with light green, narrow leaves 3–4 feet long.

ALOE, sp. Leaves numerous, erect, lanceolate-acuminate, 2–3 feet long, not much exceeded by the once or twice branching flower stalk. Just coming into bloom in February; seen only among the rocks along the trail from Purisima to San Gregorio, ten or fifteen miles from any place ever inhabited. Perhaps introduced, though it is difficult to understand how it could have become naturalized in such an isolated locality.

BRODIAEA CAPITATA Benth.—Socorro.

BRODIAEA PALMERI Watson.—San Gregorio, San Borgia.

NOTHOSCORDUM STRIATUM Kunth.—San Julio.

ALLIUM CALIFORNICUM V. & R.—San Enrique, San Julio, Agua Dulce.

CALOCHORTUS LUTEUS Dougl.—Las Huevitas.

CALOCHORTUS SPLENDENS Dougl.—San Pablo.

JUNCUS BALTICUS Dethard.—San Ignacio.

JUNCUS BUFONIUS L.—San Benito, Cajon de Santa Maria.

JUNCUS ROBUSTUS Watson.—San Gregorio, Purisima, San Ignacio.

JUNCUS XIPHOIDES Meyer.—El Rancho Viejo.

WASHINGTONIA FILIFERA Wendl.—Cajon de Santa Maria.

ERYTHEA ARMATA Watson.—San Esteban and northward.

PHŒNIX DACTYLIFERA L.—Cultivated at Comondu and San Ignacio—at the latter place spreading itself along the wet grounds.

TYPHA ANGUSTIFOLIA L.—Comondu, San Gregorio, Calamujet.

ECHINODORUS ROSTRATUS Engelm.—Comondu.

- POTAMOGETON PECTINATUS L.—San Raimundo.
POTAMOGETON, sp.—Comondu.
POTAMOGETON, sp.—San Gregorio.
RUPPIA MARITIMA L.—San Gregorio.
ZANNICHELLIA PALUSTRIS L.—Comondu.
NAIAS MAJOR All.—San Gregorio.
CYPERUS, sp.—Comondu.
CYPERUS ARISTATUS Rottb.—Comondu.
CYPERUS LÆVIGATUS L.—Calamujuet.
CYPERUS SPECIOSA Vahl. ?—Comondu.
CYPERUS, sp. Too old.—San Raimundo.
ELEOCHARIS PALUSTRIS R. Br.—San Gregorio.
ELEOCHARIS ROSTELLATA Torr.—Santa Maria.
ELEOCHARIS ARENICOLA Torr. ?—San Ignacio.
SCIRPUS LACUSTRIS L.—El Rosario.
SCIRPUS MARITIMUS L.—San Gregorio, Las Huevitas.
SCIRPUS OLNEYI Gray.—Comondu.
SCIRPUS RIPARIUS Spreng.—El Rosario.
SCIRPUS PUNGENS Vahl. ?—San Gregorio.
CAREX, sp.—Santa Maria.
FUIRENA, sp.—Comondu. Apparently distinct from all the described forms.
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The following grasses were determined by the well-known agrostologist, Dr. George Vasey, of the Agricultural Department, Washington, D. C.:

- PASPALUM DISTICHUM L.—Comondu.
PANICUM LEUCANTHUM Torr.—Magdalena Island.

Panicum Crus-galli L. ?—San Ignacio.

Panicum paspaloides Pers.—Comondu.

Panicum colonum L. var. ?—Purisima.

Panicum capillare L. var. *glabrum* Vasey.—Purisima.

Setaria caudata R. & S.—Magdalena Island.

Cenchrus echinatus L.—Comondu.

Cenchrus Palmeri Vasey. Culm 9 to 18 inches high, flattened below, branching, leafy: leaves puberulent, especially the inflated, conduplicate sheaths which are ciliate on the margins, and with a ligule of rather long white hairs; sheaths mostly as long as the internodes; blade lanceolate-linear, 4-6 inches long. Spikes consisting of 2 to 4, usually 3, large, roundish, closely approximate, purple spikelets, 1 to 1½ inches in diameter, including the spines, these are flattened toward the base, the upper part slender, the longest 6-8 lines long, diminishing to the broad base, where a few are much smaller, but there are no proper bristles. The base of the spines and the body of the spikelets are closely pubescent. Each spikelet contains 5 or 6 flowers.

First collected by Dr. E. Palmer at Guaymas, Mex., in 1887, in company with a yellow-colored variety. The present specimens are a young and small form, with the spikelet half as large as the type, but otherwise the same. Possibly it may be a distinct variety.—Common throughout the southern part of the peninsula.

Cenchrus pauciflorus Benth. ?—Boca de Las Animas.

Cenchrus myosuroides HBK.—Comondu.

Spartina stricta Roth.—Magdalena Island.

Hilaria cenchroides HBK.—Purisima.

Hilaria cenchroides var. *longifolia* Vasey.—San Julio.

Heteropogon contortus R. & S.—Magdalena Island.

ANDROPOGON MACROURUS Mx.—Santa Maria.

PHALARIS ARUNDINACEA L.

ARISTIDA SCABRA.—Chapm.

ARISTIDA CALIFORNICA Thurb.—El Llano de Santa.

ARISTIDA CALIFORNICA var. *MAJOR* Vasey.—Magdalena Island.

ARISTIDA SCHIEDIANA Trin.—Comondu.

ARISTIDA BROMOIDES HBK.—San Julio.

STIPA EMINENS Cav.—San Julio Cañon.

STIPA CORONATA Thurb.—Ubi.

ORYZOPSIS CUSPIDATA Benth.—Agua Dulce.

MUHLENBERGIA CALAMAGROSTIDEA Trin.—Comondu.

MUHLENBERGIA DEBILIS Trin.—San Jorge, Comondu.

**BEALIA MEXICANA* Scribner.—Santa Margarita Island.

SPOROBOLUS WRIGHTII Munro.

SPOROBOLUS ARGUTUS Kunth.—Magdalena Island.

SPOROBOLUS ALTISSIMUS, Vasey. Culm 4 to 5 ft. high, simple; leaves long, slender, becoming involute; panicle 6–8 inches long, narrow, the branches erect, scattered or partly verticillate, 3–4 inches long, subdivided and flower-bearing from near the base: spikelets 1-flowered, about 1 line long; empty glumes unequal and nearly as in *S. airoides*—from which it differs in its greater height, and closer panicle, as well as in details of the flower.

Collected at San Diego by Dr. Edward Palmer.

*This grass was first collected by Mr. C. G. Pringle in Chihuahua, Mex., in October, 1886. It was named by Prof. F. L. Scribner, as a new genus, in honor of Prof. W. J. Beal, of the Michigan Agricultural College. I am not aware that a description has been published. It is considered by Prof. Hackel as forming, with *Clomena* Beauv, a section of *Muhlenbergia*. It appears to have pretty strong claims to specific distinction.

SPOROBOLUS ALTISSIMUS, var. *MINOR*, Vasey. Smaller, 2-3 feet high; leaves shorter; panicle 4-6 inches long, purple; spikelets rather smaller.—San Enrique.

SPOROBOLUS VIRGINICUS Kth.—Santa Margarita Island.

AGROSTIS VERTICILLATA Vill.—Comondu, Patrocinia.

POLYPOGON MONSPELIENSIS Desf.—Cajon de Santa Maria.

CHLORIS ALBA Presl.—Magdalena Island.

BOUTELOUA BROMOIDES Lag.—Purisima.

BOUTELOUA ARISTIDOIDES Thurber.—Magdalena Island, San Gregorio.

BOUTELOUA POLYSTACHYA Torr.—Magdalena Island.

ELEUSINE ÆGYPTIACA Pers.—San Jorge.

PAPPOPHORUM WRIGHTII Watson.—San Gregorio.

TRIODIA PULCHELLA HBK.—San Joaquin, Calmalli.

DIPLACHNE IMBRICATA Benth.—San Gregorio.

DIPLACHNE VISCIDA Scribner.—San Jorge.

DIPLACHNE DUBIA Benth. var. *ARISTATA* Vasey.—Santa Margarita Island.

DIPLACHNE BRANDEGEI Vasey. Resembles small forms of *D. dubia*. Culm about 2 feet high, 2-edged below; leaves numerous, narrow; the lower sheaths conduplicate, ciliate on the margins; ligule ciliate: panicle of 8 to 15 spikes, which become spreading; spikelets 3 lines long, 1 or 2 flowered, with an imperfect rudimentary one; empty glumes 1 nerved, the lower about half as long as the upper, upper one $1\frac{1}{2}$ inches long, acuminate; flowering glume 3 lines long, lanceolate-acute, tipped with a short barbed point, 3 nerved; palea rather shorter than or equal to its glume; the second flower neutral or rudimentary, stalked, half as long as the lower flower, which has a crown of short, silky white hairs around the base.

Collected at Magdalena Island. Also at Santa Margarita Island and Purisima.

MONANTHOCHLÆ LITTORALIS Engelm.—Magdalena Island.

PHRAGMITES COMMUNIS Trin.—San Gregorio.

ERAGROSTIS PURSHII Schrad.—San José de Gracia.

ERAGROSTIS MAJOR Host.—San Esteban.

ERAGROSTIS MINOR Host.—Magdalena Island.

ERAGROSTIS REPTANS Nees.—San Jorge, Purisima.

ERAGROSTIS MEXICANA Link.—Comondu.

MELICA IMPERFECTA Trin.—El Rancho Viejo.

POA BIGELOVII Vasey & Scribner.—El Rancho Viejo.

FESTUCA MICROSTACHYS Nutt. var. *CILIATA* Gray.—San Esteban.

BROMUS SEGETUM Schl.—San Julio Cañon.

DISTICHLIS MARITIMA Raf.—Magdalena Island.

HORDEUM PRATENSE Huds.—El Rancho Viejo.

ELYMUS ORCUTTIANUS Vasey.—El Rancho Viejo.

The names of the ferns and the notes given below were kindly furnished by Prof. D. C. Eaton, of Yale College:

GYMNOGRAMME TRIANGULARIS Kaulf.—San Julio Cañon.

NOTHOLÆNA LEMMONI D. C. Eaton.—Purisima.

NOTHOLÆNA SINUATA Kaulf.—San Benito, San Ignacio and northward.

NOTHOLÆNA CRETACEA Liebm.—Santa Margarita Island, Purisima, Comondu, etc.

NOTHOLÆNA HOOKERI Eaton.—Purisima.

CHEILANTHES WRIGHTII Hook.—Comondú.

The specimens show more resemblance to *C. microphylla* than any others seen.

CHEILANTHES MYRIOPHYLLA Desv.—San Sebastian, San Enrique.

CHEILANTHES LINDHEIMERI Hook.—El Rancho Viejo.

CHEILANTHES, sp.—If not Hooker's *Cheilanthes* (or *Pellaea*) *Seemanni*, it is a new species.—Magdalena and Santa Margarita Islands, San Benito.

PELLEA WRIGHTIANA Hook.—The form named by Hooker, *P. longimucronata*, San Julio Cañon; and from El Rancho Viejo true *P. Wrightiana*, as originally figured by Hooker.

ADIANTUM CAPILLUS-VENERIS L.—Santa Maria.

SELAGINELLA RUPESTRIS Spring.—San Julio.

MARSILIA VESTITA Hook. & Grev.—San Jorge.

ADDITIONS AND CORRECTIONS.

The preparation of the foregoing list having been much hurried on account of the necessity of issuing the volume of Proceedings at the end of the year, the determination of many of the species will be given in a subsequent paper. A considerable number were not in any way included, being not even generically identifiable, either for lack of essential organs, or for the little time at command.

Dr. Palmer's No. 179 from Guaymas, was collected at Purisima, again in imperfect specimens. Dr. Watson writes that it was brought in a similar condition by Xantus from Cape St. Lucas.

ECHINOCYSTIS BIGELOVII (Watson). Misled by the very oblique fruit and lacking an authentic specimen, a synonym (*Cyclanthera monosperma*, p. 159, ante) has been furnished

for it. It cannot however, if obliquity of the fruit counts for anything, be included in *Echinocystis*, as has been done by Cogniaux, Monog. Phan. iii, 804, nor can it very well be congeneric with the symmetrical-fruited *E. mininia* (Kell.) in Naudin's genus *Echinopepon*, as proposed by Dr. Watson.

The following species, not included in the above list, are from a small private collection made by Ensign McCormick and Mr. C. H. Townsend of U. S. S. Albatross, at Cape St. Lucas, San Luis Gonzales Bay, etc.

DALEA MOLLIS Benth. A species common throughout the peninsula, and omitted by accident from the list.

ENCELIA ERIOCEPHALA Gray.

HEPEROCALLIS UNDULATA Gray. Hardly to have been expected as far south as the Cape.

EUPHORBIA LEUCOPHYLLA Benth. A rare and little known species.

From San Pedro Martir Mountain, to which place they had gone on a zoological expedition, Mr. Townsend and Mr. A. W. Anthony brought the following conifers: .

CUPRESSUS GUADALUPENSIS Watson. Differing somewhat from the type, but, according to Prof. C. S. Sargent, not separable from it.

PINUS LAMBERTIANA Dougl.

PINUS PONDEROSA Dougl. var. *JEFFREYI* Engelm.

PINUS MURICATA Don.

PINUS PARRYANA Engelm.

CONTRIBUTIONS TO NORTH AMERICAN EUPHORBIACEÆ.

BY C. F. MILLSAUGH, M. D.

1. UPON A COLLECTION OF EUPHORBIACEOUS PLANTS MADE BY MR. T. S. BRANDEGEE, IN 1889, ON THE MAINLAND OF LOWER CALIFORNIA AND THE ADJACENT ISLANDS OF MAGDALENA AND SANTA MARGARITA.

The peninsula of Lower California and the adjacent islands have proven a rich field to botanical explorers, and great interest is always taken in the collections returned therefrom. The soil being mostly what is usually termed sterile, is especially suited to the majority of Euphorbiaceous species.

Although not working over the exact district represented by the collection of H. M. S. Sulphur, Mr. Brandegee has succeeded in duplicating all but two of the species of that collection, while he has added thirty more—twelve of which are new to science. He has also duplicated seven of the ten species collected by Dr. Edward Palmer in 1887, and re-established the only new species of that collection.

The fact that *Euphorbia maculata*, *E. albomarginata* and *E. misera* are not found in this collection is not without meaning; they cannot occur, unless with exceeding rarity, in the districts so completely searched over. The discovery of two new species of *Phyllanthus* upon the northern confines of that vast genus is also noteworthy.

It will be noticed that only one locality is mentioned for each species of the collection; this is due to the difficulty of transporting any considerable number of specimens on such a tiresome overland journey. Having once collected a species Mr. Brandegee usually passed it by thereafter, thus the station given is substantially the most southerly one upon the route.

Whatever Mr. Brandege's collection may yield in other orders, it is certainly a most careful one in this, and goes far to prove that this peninsula bids fair to produce a large addition to the flora of North America.

SIMMONDSIA CALIFORNICA Nutt. (in Hook. Lond. Jour. Bot., 1844, p. 400). This somewhat confusing plant has been buffeted about between Euphorbiaceæ and Buxaceæ constantly since its discovery, and will probably find rest only in a new and intermediate order. It has been placed in Euphorbiaceæ by Nuttall, 1844; Lindley, Baillon, Engelm. and Watson (1888), and in Buxaceæ by Müller, and Watson, (1880) The plant has characters common to both orders which seem to make it a true link between them. Not having access at present to sufficient data for studying the plant, we shall include it provisionally in this list.—San Gregorio, February.

PHYLLANTHUS (§ *GOMPHIDIUM*) *BRANDEGEI* sp. nov. Annual, erect, glabrous, branching from the base; branches terete, $\frac{1}{2}$ –3 dm. long, with short internodes. Leaves linear-lanceolate, the largest 13 mm. long, 3 mm. wide, acute at both ends, very short petiolate (about 1 mm. long); stipules triangular subulate and hyaline at the tip. Inflorescence geminate in the axils, or the male often wanting; calices 5, rarely 4–6 lobed, the female twice the size of the male, lobes ovate-acute, or the male nearly deltoid: female flowers peduncled, red; calyx spreading, the lobes becoming ovate-spatulate in fruit; styles 3, separate to the base, bilabiate at the apex; ovary glabrous, glands as many as the lobes of the calyx. Male flowers sessile, or nearly so at the base of the female peduncle; lobes green, more or less deltoid; stamens 3, the filaments united only at the very base; glands 3, on one side of the base, somewhat crenately 3-lobed. Capsule subglobose, glabrous, reddish, 4 mm. in

diameter; seeds black, smooth when ripe, when nearly ripe of a cinnamon-brown color covered with black punctæ.

A peculiar ligneous shrub-like herb, with virgate branches, short internodes and fugacious leaves, the older branches appearing as if dead, while the branchlets given off at their bases are in leaf, flower and fruit.—Comondu, February 17th, mature.

PHYLLANTHUS (§ **MENARDA**) **CILIATO-GLANDULOSUS**, sp. nov. Annual, spreading from the filiform root, densely glandular-ciliate throughout, except the oldest leaves, which retain but few cilia. Stems terete, somewhat irregularly branching; leaves petioled, mostly ovate, obtuse or emarginate (often obtusely deltoid), abrupt at the base, petioles one-third the length of the blade; stipules orbicular. entire. Inflorescence axillary, more or less geminate; flowers of both sexes pedicellate. Male calyx 5-cleft, the lobes ovate-acute, with 5 small anther-like, stipitate glands opposite the clefts, stamens five, filaments separate to the base. Female flowers larger: calyx lobes 5, lanceolate, obtuse, hyaline-margined, with 5 alternating cylindrical glands at the base; styles cleft to the middle, or in many flowers, entirely to the base; stigmas slightly recurved; ovary globose, ciliate-glandular. Capsule depressed, globose, glandularly ciliate; seeds pale brown, finely pitted, each pit occupied by a bran-like scale.

Full-grown fruiting specimens vary from $2\frac{1}{2}$ cm. to 2 dm., stems from 1 cm. to $1\frac{1}{2}$ dm. in length, leaves $1\frac{1}{2}$ cm. long, 1 cm. broad, and much smaller to minute.—Magdalena Island, February 25th.

CROTON (§ **EUCROTON**) **CILIATO-GLANDULOSUS**, Ortega (Plant. rar. hort. matrit. dec. 4, p. 51, 1797). The specimens differ considerably in vegetative appearance from those gathered last year near Monterey, Mexico, by Pringle, though the specific characters are exactly the same.—Paraiso, May 2d, not yet in fruit.

CROTON (§ DECARINIUM) MAGDALENÆ, sp. nov. A branching shrub 1 meter high; branches terete, densely covered with a matted, partly stellate, tomentum. Leaves large, petiolate, cordate, acute, reticulately veined and stellate pubescent on the parenchyma; veins densely woolly beneath; stipules represented by a single axillary bud-like gland. Inflorescence terminal, spicate, sessile, the female in a whorl at the base, the male scattered along the rhachis above; rhachis elongated, quadrangular, twisted, furnishing a short bract to the base of each floral pedicel. Female calyx unequally 5 parted, the lobes ovate acute; petals wanting; ovary densely tomentose; styles dichotomously divided almost to the very base, the lobes linear elongated with a tooth-like process at about the middle—rudiment of another bifurcation. Male calyx 5 parted, the lobes deltoid, equal; petals lanceo-spatulate alternate with and longer than the sepals, hairy at the base; stamens 15 (more or less), filaments hairy at the base. Capsules densely tomentose and stellate pubescent below; seeds shining, smooth, with a few slight, smooth longitudinal ridges upon the dorsum, and a short, spinous process at the summit behind the sarcous caruncle.

Branches 1-3½ dm. long; leaves 10 cm. long, 8 cm. broad, and smaller, perfectly cordate; petioles about one-third the length of the blade: spikes 5-9 cm. long: capsules 14 mm. in diameter; seeds 7 mm. long, 5 mm. broad.—Magdalena Island, January 17th.

CROTON (§ DREPADENIUM) CALIFORNICUS Müll. (DC. Prod., xv., pars. 2, p. 691).—Magdalena Island, January 23d; in fine form of flower and fruit.

ARGYTHAMNIA (§ *Aphora*).

ARGYTHAMNIA BRANDEGEL. sp. nov. Shrubby, glabrous, perennial, about 2 meters in height, with drooping branches 4 decimeters or less in length. Leaves alternate, lanceolate, acute, closely blunt serrate from the base to the apex,

narrowing to the petiole, 2-7 cm. long, $1\frac{1}{2}$ cm. or less broad; petiole about one-quarter the length of the blade. Inflorescence in short, and at first dense axillary racemes, the female flowers below; bracts more or less leafy, about the length of the sepals. Male flowers: sepals 5 linear-lanceolate, acute, green, 5 mm. long; petals 5, about the length of the sepals, lanceolate membranaceous deeply marked with purple veins, rose colored, with a greenish-white hyaline tip; stamens 5, in a whorl near the summit of the column of filaments which is terminated by a few rudiments of stamens. Female flowers: sepals lanceolate, serrate, acuminate, green, 8 mm. long; petals lanceolate, serrate, purple-striate at the base, one-half the length of the sepals; glands auriculate, entire, hypogynous; styles bifid for over one-third their length; stigmas slightly clavate. Capsule 8 mm. broad, smooth; carpels blackish purple, ridged; seeds greenish, pyriform, 6-angled, (3 acute alternating with 3 obtuse), apiculate, slightly reticulated near the base, 5 mm. long, 3 mm. broad.—San Gregorio, February 1st.

ARGYTHAMNIA SERRATA Müll. Arg. (Linnæa xxxiv 147). A depauperate form, retaining however all the specific characters.—San Pablo, April 17th, not in fruit.

ARGYTHAMNIA SERRATA, var. *MAGDALENÆ* var. nov. Stems 9-13 cm. long, leaves as in the species, petals straw-color, styles parted to the middle, seeds smooth and somewhat farinose.

The vegetative characters and the seeds of this variety plainly distinguish it from the species.—Magdalena Island, January 13th.

ARGYTHAMNIA SERICOPHYLLA Gray var. *VERRUCOSEMINA*, var. nov. Branches 1-2 dm. long; leaves sessile, $1\frac{1}{2}$ - $3\frac{1}{2}$ cm. long, the lower ovate to ovate lanceolate, racemes 1-2 flowered; sepals lanceolate acuminate (4 mm. long), longer than the broadly lanceolate petals; glands in the female flowers del-

toid; seeds markedly tuberculate throughout; 2 mm. in their long diameter.

This variety seems to connect the species to *A. lanceolata* Mull.—San Gregorio, February 2d.

ACALYPHA (§ BETULINÆ) CALIFORNICA, Benth. (Bot. Sulph. Voy., p. 51). Typical specimens in good flower and fruit from Magdalena Island, January 14th.

ACALYPHA (§ BETULINÆ) COMONDUANA, sp. nov. Stems terete, minutely pubescent, 4 dm. or more in length. Leaves large, ovate lanceolate, abrupt or somewhat cuneate at the base, acute, the margins crenate dentate from the base to the apex; minutely pubescent, especially upon the veins above and beneath; petioles about two-thirds the length of the blades; stipules subulate-lanceolate, deciduous; inflorescence axillary, spicate, the male in the upper axils and sometimes also in the lowest. Female spikes pedunculate, loosely 6–12-flowered; the bracts sessile, orbicular, 2-flowered, crenately 15–20-toothed, calyx lobes triangular acute, styles 3, each lacinate into 5–10 capillary divisions; ovary pubescent; male spikes pedunculate, densely floral, often with a female bract or two at the base of the peduncle, capsule

Leaves 9 cm. long, $4\frac{1}{2}$ cm. broad and less; petioles $4\frac{1}{2}$ cm. long and less; stipules 5 mm. long. Female spikes 2–4 cm. long; bracts 5 mm. in diameter; styles about 1 cm. long. Male peduncles $1\frac{1}{2}$ cm. long, the spikes about 1 cm. long during anthesis. The character of the growth of this species is indeterminable from the branches collected. The plant is also too young to yield fruit; many characters are therefore wanting to complete the description.—Comondu, February 18th.

BERNARDIA (§ *Tyria*).

BERNARDIA MYRICIFOLIA, (Scheele) Watson (Bot. Cal., ii., 70). Beautiful specimens in full flower and fruit from San Sebastian, April 28th.

BERNARDIA VIRIDIS, sp. nov. An upright, irregularly branching shrub; branches glabrous below, sparingly stellate pubescent toward the ends; leaves thick, oblong to nearly ovate, obtuse, somewhat cuneate at the base, olive-green above, paler beneath, and reticulate veined; margin repandly dentate, the midrib and veins beneath densely woolly with a stellate-pubescent that is distinctly separate upon the parenchyma above and below; petioles of the full-grown leaves full one-quarter the length of the blade; inflorescence dioecious, the staminate flowers sessile in very short 2-6-flowered clusters or racemes; calyx 3-parted: pistillate flowers, terminal, sessile; capsule densely stellate-pubescent; seed oval, straw-color, smooth, plainly carinate.

Branches 8 cm. to $2\frac{1}{2}$ dm. long; leaves 2-3 cm. long, $\frac{1}{2}$ - $2\frac{1}{2}$ cm. broad; capsules 12 mm. in its longitudinal diameter; seeds 7 mm. long, 5 mm. broad.—San Pablo, April 22d.

TRAGIA (§ **EUTRAGIA**) **URTICÆFOLIA** Michx. (Flor. Bor. Amer., vol. ii, p. 176.)—Very characteristic specimens from San Esteban, April 18th.

JATROPHA (§ **CURCAS**) **CANESCENS** Müll. (DC. Prod., xv., pars. 2, p. 1079.)—Specimens in flower, with the fruit of the previous season, at Magdalena Island, January 12th.

JATROPHA (§§ **MOZINNA**) **SPATHULATA** Müll., var. **SESSILIFLORA** Müll. (DC. Prod. xv, pars. 2, p. 1082). A form with smaller leaves, and more or less paniculate inflorescence.—San Gregorio, February 2d.

STILLINGIA (§ **GYMNOSTILLINGIA** Watson, *vide infra*.) **LINEARIFOLIA** Watson. (Proc. Am. Acad., vol. xiv, p. 297.) Beautiful specimens, in fine flowering and fruiting condition, from Cardon Grande, April 23d.

SEBASTIANIA (?) **BILOCULARIS** Watson. (Proc. Am. Acad., vol. xx, p. 374.) Our specimens agree with the description of this unsettled species except in the leaves; those of the description being "linear oblong or narrowly lanceolate

. . . . obscurely glandular toothed;" while those of our specimens are oblong lanceolate, acute to cuneate at the base, the margin regularly serrate, the teeth armed with an incurved bristle. Leaves $1\frac{1}{2}$ –5 cm. long, and $\frac{1}{2}$ – $1\frac{1}{2}$ cm. wide.

This plant, is so far provisionally placed under *Sebastiania*, the peculiar bi-ocular ovary and two thick, twisted styles, as well as the imperfect columella and estrophiolate seed, will probably cause its removal from this genus when it is better known.—Purisima, February 12th, in excellent floral condition, but lacking fruit.

PEDILANTHUS (§ *EUPEDILANTHUS*) *MACROCARPUS* Benth. (Bot. Sulph. Voy., p. 49.) Magdalena Island, January 12th, with old fruit.—El Llano de Santana, May 10th, in flower.

EUPHORBIA (§ *Anisophyllum*.)

EUPHORBIA PYCANTHEMA Engelm. (Bot. Mex. Bound. Surv. 2, p. 188.) *Forma serrata*, the lower leaves sharply serrate upon one or both margins.—Pozo de Los Dolores, April 5th. Too young for good fruit.

EUPHORBIA HYPERICIFOLIA Linn. (Hort. Cliff., 198.) The specimens are of the true West Indian form, from which the species was made.—Purisima, February 14th.

EUPHORBIA SERPENS Kunth. (in H. B. nov. gen. et sp. ii, p. 41). Our specimens are of a form hairy at the nodes and upon the younger branchlets.—Magdalena Island, January 23d.

EUPHORBIA MAGDALENÆ Benth. (Bot. Sulph. Voy., p. 50). Our specimens agree precisely with Bentham's description, which, however, is incomplete as to flowers and fruit. Dr. E. Palmer's specimen (No. 26 of his collection at Muleje, Lower California) lacked fruit. We therefore add the following to Boissier's description of the specimen in herb. Bentham (D. C. Prod., pars. xv, p. 37), and that of Watson from Dr. Palmer's specimen (Proc. Am. Acad., xxiv, p.

74). Involucres solitary in the upper axils and terminal on the branchlets of the season; turbinate, raised upon a filiform peduncle about twice the length of the involucre; lobes triangular, ciliate; glands subreniform entire; appendages white or pinkish; styles bipartite. Pod smooth, carpels carinate; seeds obscurely quadrangular, whitish, very nearly or quite smooth between the angles.

There is a peculiarity about this species that we have never noticed in other species of this genus: many of the involucres (in one specimen ten) become aborted and prolonged into pod-like bodies from 1-1½ cm. long and about 2 mm. in diameter, bearing rudimentary or aborted flowers at the base, and the four glands at the apex. This peculiarity would seem to be a constant factor, as Bentham noted the same sort of "growth" upon the original specimens, and Watson writes us that they are also upon Dr. Palmer's specimens, collected on Carmen Island.—Magdalena Bay, January 18th.

EUPHORBIA TOMENTULOSA Watson (Proc. Am. Acad., xxii, p. 476).—San Gregorio, February 1st, with fruit partially developed.

EUPHORBIA PURISIMANA, sp. nov. Stems terete, sparsely and minutely villous, spreading from the base and dichotomously branching, branches numerous, filiform, leaves short-petioled, entire, ovate-acute, obliquely tapering at the base, the largest 6 mm. long, 4 mm. wide, stipules absent. Inflorescence solitary at the bifurcations and in the upper axils; involucre pedunculate, nearly glabrous, the lobes large, triangular and entire; glands transversely ovate, dark maroon, on thick stipes about twice their length; appendages mostly wanting, when present (in about 1 in 30 in our specimen) they are minute white or rose, and vary in shape from triangular-obtuse to obcordate, or transversely ovate, with 2-3 sharp teeth on the margin. Capsules slightly hairy, the

carpels sharply keeled, seeds obtusely tetrangular, pinkish when young, with irregular anastomosing ridges between the angles; when full ripe cinnamon color, with the anastomosing ridges almost broken up into tubercules.

Whole plant of the general appearance of *E. serpens*. Stems 1-1½ dm. long, diffusely branching, capsules 2 mm. long, 1½ mm. wide, seeds 1½ mm. long. Near *E. podadenia*. Purisima, February 12th.

EUPHORBIA SERPYLLIFOLIA Pers. (ench. bot., 2, p. 14).—Comondu, February 15th.

EUPHORBIA SETILOBA Engelm. (Pacif. R. R. Rept., 2, p. 364).—Purisima, February 14th.

EUPHORBIA PETRINA Watson. (Proc. Am. Acad., xxiv., p. 75).—San Esteban, April.

EUPHORBIA BRANDEGEI, sp. nov. Annual; prostrate spreading, branches filiform, 2-4 cm. long, the internodes sparingly pubescent, the nodes and terminal branchlets quite hairy. Leaves ovate, the largest 3 mm. long, 2 mm. broad, obtuse, unequal at the base, the larger few-dentate, the smaller simply and sparingly crenulate, petioles about one-third the length of the leaves; stipules represented by a few cilia. Involucres turbinate, pedunculate, solitary in the upper axils, hairy without and within, lobes triangular ciliate; glands 4, reddish-brown, transverse oblong, concave; appendages white, conspicuous, the margin crenulately and irregularly 3-8 toothed. Capsule 1 mm. long, very hairy, carpels keeled; stigmas unequally bipartite to the middle; seeds elongated tetrangular, pointed, sharply 4-6 ridged transversely including the angles.

A very delicate species, near *E. portulana*.—Magdalena Island, January 21st.

EUPHORBIA POLYCARPA, Benth. (Bot. Sulph. Voy., p. 50). El Llano de Santana, May 9. The form (*E. micromera* Boiss. D. C. Prod., xv., pars. 2, p. 44).—Magdalena Island, January 15th.

EUPHORBIA POLYCARPA Benth. var. *VESTITA*, Watson (Bot. Calif., ii, p. 73). Beautiful specimens with comparatively large rose appendages, deep maroon glands, and very characteristic seeds.—El Rancho Viejo, April 20th.

EUPHORBIA PEDICULIFERA Engelm var. *MINOR*, var. nov. Procumbent, stems filiform; branchlets pubescent, especially near the involucre, which are densely covered with long white hairs. Leaves, ovate-obtuse very small, 1–3 mm. long by $1\frac{1}{2}$ – $2\frac{1}{2}$ mm. broad. Glands brownish-green; appendages white, transversely ovate, crenate; capsules and seeds characteristic of the species.—Santa Margarita Island.

EUPHORBIA CONJUNCTA, sp. nov. Stems prostrate, spreading, branches terete, dichotomous sparsely appressed hairy, leaves oblong-spatulate, sparingly short hairy on the surface, short petioled, unequal at the base, entire stipules triangular hairy. Inflorescence solitary in the axils (before the fruiting season they are so densely crowded with the young leaves as to appear glomerate), involucre turbinate, hairy, sessile or nearly so, lobes triangular, glands deep maroon, transversely ovate; appendages from rose to white, and of all forms (even on the same branch) from transversely ovate entire, crenulate, or deeply blunt lobed, to lanceolate, or in many cases entirely wanting; styles deeply bifid, the lobes circinate. Capsule densely pubescent, carpels carinate, seeds ash color, oblong, obscurely tetragonal, with 3 strong transverse ridges that include the angles.

This peculiarly appendiculate species seems to form a connection between *E. pediculifera* and *E. glyptosperma*. Purisima, February 12th, only one developed fruit.

EUPHORBIA INVOLUTA, sp. nov. Entire plant tomentose, stems erect, irregularly branching, very fragile. Leaves linear-spatulate obtuse, narrowing to the petiole, margin entire, strongly involute; petioles about one-third the length of the blade, stipules deltoid. Inflorescence in compact

leafy terminal glomerules; involucre inflated campanulate short pedunculate, lobes sharply triangular. Glands transversely oblong, slightly concave, of a deep maroon color almost black; appendages transversely elliptical, entire, white, sometimes wanting in involucre of the same head. Styles bipartite to the middle, stigmas somewhat clavate. Capsules densely tomentose obpyriform, the carpels strongly keeled, seeds elongated-tetragonal, cinnamon brown; when mature, strongly marked by 6 parallel (4 central complete, 2 terminal incomplete) transverse ridges which include the angles.

Stems 1-2 dm. long, leaves 3-5 mm. long, 1-3 mm. broad; capsules 3 mm. long, seeds 2 mm. long, 1 mm. broad. Near *E. leucophylla*.—Comondu, April.

EUPHORBIA GEMINILOBA, sp. nov. Annual (?) ascending, slightly hairy; stems terete fragile, internodes long (1-4 cm); branches divergent (15 cm. long, and shorter); leaves elliptical (1½ cm. long, 8 mm. and less, wide), very obliquely truncate at the base, acute, the margin sharply and coarsely toothed, especially upon the longest side, all green above and pallid beneath; stipules lanceolate, ciliate. Inflorescence in terminal leafy-bracted capitate clusters; involucre sessile or nearly so, subcylindrical, hairy; lobes lanceolate, ciliate, mostly geminate; glands small, orbicular, nearly plane, long stipitate; appendages about twice the size of the glands, white, orbicular, concave, mostly entire; stigmas elongated, bifurcated. Fruit Pozo de Los Dolores, April 5th, not yet in fruit.

(§ *Alectroctonum*.)

EUPHORBIA XANTI Engelm. (in litt.); a form with broadly obovate, petiolate stem leaves narrowing and slightly unequal at the base; 2 cm. long, 1½ cm. broad.—Purisima, February 12th. and Comondu.

(§ ——— ?)

EUPHORBIA COMONDUANA, sp. nov. Frutescent, glabrous stems ascending, bark in whitish striæ covering almost completely the pinkish inner layer; branchlets small, of annual growth, nearly alternate, and given up completely to the alternate or more or less fasciculate leaves. Leaves orbicular, thin, on long filiform petioles, obtuse or slightly retuse, pinnately veined, entire; stipules lanceolate, ciliate; involucre solitary at the ends of the branches, shallow, turbinate, glabrous, pedunculate; lobes triangular, few fibrillate; glands, 5, greenish-brown, thin, plane, circular, each folded upward upon itself; appendages grass-green, irregularly 5-9 toothed, mostly of the form of a lobster's claw; stigmas short bilabiate, the labia circinate: bracts between the male flowers numerous, plumose. Capsule (immature) glabrous, deeply trisulcate, carpels strongly keeled, seeds

Leaves from $1\frac{1}{2}$ - $2\frac{1}{2}$ cm. in diameter, petioles from 6 mm. to 2 cm. long, generally of the length of the blade, internodes about 3 cm. long, branchlets $1-2\frac{1}{2}$ cm. long, much reduced as compared with the stout stems. This curious species stands by itself as a type of what may prove a new section in *Euphorbia*. The absence of mature fruit and seeds is deeply deplored.—Comondu, March 23d.

(§ *Tricherstigma*.)

EUPHORBIA HINDSIANA Benth.? (Bot. Sulph. Voy., p. 51.) As far as Boissier's description goes for this species found at Cape St. Lucas and *E. Californica*, at Magdalena Bay, these specimens embrace some of the characters of both. They have the stems, leaves, petioles, capsules and carpels of *E. Hindsiana*, and the involucre and all that is included in them of *E. Californica*. The seeds of the former are described as "*albido-foveolato*," where the latter are said to be simply "*depresso-punctato*." In our specimens we find both kinds in one capsule; age will account for the difference

between them. Until we have seen the two species in herb. Benth., we shall feel inclined to consider both as simply forms of one species.—Magdalena Island, January.

(? *Poinsettia*.)

EUPHORBIA HETEROPHYLLA Linn., var. *ERIOCARPA*, var. nov. Glabrous, erect, lower leaves fugacious (not present in our specimens), branching at the summit only, forming a "bushy" top. Leaves oblong lanceolate, entire or remotely dentate, and somewhat irregularly margined, $\frac{1}{2}$ –2 $\frac{1}{2}$ cm. long, 3–14 mm. wide, the young petioles canescent; involucre solitary, terminating the young branchlets, peduncles woolly; capsules densely woolly when young, slightly hairy when mature; seeds densely tuberculate on and between the angles, the tubercles white-farinose on the tips.—Comondu, March 21st.

EUPHORBIA ERIANTHA Benth. (Bot. Sulph. Voy., p. 51.) The richest growth and most complete specimens we have ever seen. From Magdalena Island, January 22d, in full fruit.

(? *TITHYMALUS*.)

EUPHORBIA DICTYOSPERMA Fisch. et Mey. (ind. h. Petrop., 1835, p. 37.)—San Enrique, May 2d, full ripe fruit.

RICINUS COMMUNIS L.—San Gregorio.

FUNGI COLLECTED BY T. S. BRANDEGEE IN LOWER CALIFORNIA, IN 1889.

BY H. W. HARKNESS.

BATARREA PHALLOIDES (Dicks.)—Magdalena Island.

PODAXON CARCINOMALE (Desv.)—San Gregorio.

TULOSTOMA MAMMOSUM (Mich.)—San Gregorio.

TULOSTOMA OBESUM Cke. & Ellis.—Purisima, collected by C. D. Haines.

DOASSANSIA ALISMATIS (Nees.)—On *Echinodorus rostratus* at Comondu.

PUCCINIA ÆNOTHERÆ Vize.—On *Ænothera cardiophylla*, Santa Maria.

PUCCINIA MALVACEARUM Mont.—On *Abutilon*, San Gregorio.

PUCCINIA ORNATA, sp. nov. (Plate XII.) Sori minute, hypophyllous, pulvinate, dark brown: uredospores mixed with the teleutospores, at first round or obovate, echinate becoming oblong or oval, and nearly smooth, about 20 μ . in diameter: teleutospores dark brown, oblong, constricted in the middle, rounded at each end: epispore thickened at apex, sparingly tuberculate, 50–70 \times 30–40 μ .: pedicel about twice as long as the spore, stout, hyaline, flexuous, thickened and lobulate at base, above furnished with about three whorls of branching hyaline processes as long or a little longer than its diameter.—On living leaves of *Tecoma stans*, Comondu.

Related to *P. Medusæ* Speg., but differing much in size, the length and appendages of the pedicels, etc. The teleutospores in this, as in very many other species of *Puccinia*, are sometimes 1-celled.

PHYLLOSTICTA ERYSIPOIDES Sacc.—On living leaves of *Chilopsis saligna*, Calamujuet.

CAMAROSPORIUM PATAGONICUM Speg.—On living leaves of *Atriplex Magdalenæ*, Magdalena Island.

PHYLLACHORA CROTONIS (Cke.)—On living leaves of *Croton Culifornicum*, Magdalena Island.

MAZZANTIA GALII (Fr.)—On *Galium stellatum*, San Borgia.

MONTAGNELLA. sp.—On dead twigs of *Ephedra Nevadensis*, Magdalena Island.

PLEOSPORA HERBARUM (Pers.)—On stems of *Lyrocarpa Coulteri* and *Samolus Valerandi*, San Gregorio, San Enrique.

**DESCRIPTION OF A NEW TURTLE FROM THE SACRAMENTO
RIVER, BELONGING TO THE FAMILY OF TRIONYCHIDÆ.**

BY J. J. RIVERS.

University of California.

Aspidonectes Californiana.

A robust species, longer than wide, the general form being sub-ovate, the front edge of the carapace forming an arc to the shoulders, then gradually widening to behind the middle and then decreasing to the caudal region, where the broad flap is somewhat acuminate. The length of the carapace, including the flap or margin, is 10 inches; at the ends of the arc across the shoulders, $7\frac{3}{4}$ inches; at the widest part behind the middle, $8\frac{1}{2}$ inches. The color above is dark plumbeous, mottled with light gray, but there are large patches of cloudy black dispersed over the upper surface. The central area of the carapace covering the osseous portion has a smooth epidermis, but the margins and flats are rugose tuberculate. The edge of the front margin of the shield has a distinct row of large tubercles; there are also some much flattened tubercles, that are connected with them somewhat irregularly alternate; there are also a series of compressed tubercles just behind these, and situated upon the upper edge of the front margin, which continue all round the flaps; but on the outer edge of the bony portion of the carapace this single series of tubercles runs into a greatly developed and numerous series of rows of tubercles, situated upon the ventral flap and reaching upon the carapace proper; the central row is well defined, numbering ten tubercles, and forming what may be called the hind portion of a dorsal ridge. At the front end of the dorsal ridge, or keel, and continuous with the front margin, is a prominent tumor or oil gland; it is sub-circular, of an inch and a quarter in diameter; it is easily probed to the depth of five-

eighths of an inch, from which oil issues slowly. Head and snout, $3\frac{1}{2}$ inches; snout, half an inch; lower lip cleft in front, with the sides very much thickened; neck, six inches long, and at its base, just under the front edge of the carapace, is a massive collection of wattles, and upon the back of the neck are a distant set of finely pointed papillæ. Legs stout, and armed with three greatly developed claws. Tail thick, projecting $1\frac{1}{2}$ inches beyond the broad flap. Beneath and covering the plastron the color is mottled sordid leaden gray, but under the flaps, and at the base of the thighs, whitish.

A careful examination has been made of the osseous portion of the skull, which gives the following details, and these have been compared with the details of the skulls of two of the allied species, which clearly shows the distinctness of each. Dr. G. Baur, the famed herpetologist, kindly manipulated the comparative work, and this fact establishes the specific value of this species with more certainty and value than had I relied solely upon my own determination.

Aspidonectes Californiana.

1. Postorbital arch less than $\frac{1}{2}$ antorbital.
2. Interorbital arch $>$ postorbital $>$ antorbital.
3. Symphyses of maxillaries long.
4. Alveolar surface of maxillaries broad, reducing size of posterior nares.
5. Symphysis of lower jaw $>$ than longitudinal diameter of orbit.
6. Interorbital arch $= \frac{1}{2}$ longitudinal diameter of orbit.
7. Pterygoids not much emarginated, nearly quadrate.
8. Pterygoid foramen not arched over by pterygoid.

Aspidonectes spinifer.

1. Postorbital arch about $\frac{1}{2}$ antorbital.
2. Interorbital arch $>$ postorbital $>$ antorbital.
3. Symphyses of maxillaries short.
4. Alveolar surfaces of maxillaries, not reducing the size of posterior nares.
5. Symphysis of lower jaw $<$ than longitudinal diameter of orbit.
6. Interorbital arch less than $\frac{1}{2}$ longitudinal diameter of orbit, nearly $\frac{1}{3}$.
7. Pterygoids much emarginated, nearly quadrate.
8. Pterygoid foramen arched over by pterygoid.

Aspilonectes Emoryi.

1. Postorbital arch very much more than $\frac{1}{2}$ antorbital.
2. Interorbital arch = antorbital, > postorbital.
3. Symphyses of maxillaries short.
4. Alveolar surface of maxillaries not reducing size of posterior nares.
5. Symphysis of lower jaw < longitudinal diameter of orbit.
6. Interorbital arch less than $\frac{1}{2}$ longitudinal diameter of orbit.
7. Pterygoids much emarginated, nearly quadrate.
8. Pterygoid foramen arched over by pterygoid.

The general appearance of *A. Californiana* reminds one of *A. Emoryi* by the tubercles on the front edge of the shield, and by the series of prominent tubercles upon the posterior portion of the shield and anal portion of the flap, but the latter is separated from the former by the presence of "small white tubercles that cover the whole surface of the upper part like grains of sand," while in *A. Emoryi* these white tubercles make one of the specific characteristics.

This addition to the Fauna of North America and to California in particular, was captured in the Sacramento River, near the city of Sacramento, by a party of gentlemen engaged in fishing, their names being Messrs. W. J. Terry, H. B. Denson and J. C. Jones. These gentlemen, considering their captive something unusual, kindly forwarded it to the Museum of the University of California.

The elder Agassiz, in 1857, writing upon American Testudinata, mentioned but one species of turtle as the sole representative of its order in the Californian fauna, and though the Californian region reached from the Straits of

Juan de Fuca to the Gulf of California, he seemed to infer that this dearth of shield reptiles was what might be expected in such a country, at least so I understand him. The list of the Californian Testudinata at the present writing number seven species, five out of the seven are the following: *Aspidonectes Californiana*, n. sp.; *Cinosternum Sonoriense* Le C.; *Platythyra flavescens* Ag.; *Actinemys marmorata* B. & G.; and *Xerobates Agassizi* Cooper. There is also credited to California upon good authority, *Cinosternum Doubledayi* Gray; and I have a worn shell of a very distinct species of *Chrysemys* taken from the upper waters of the Sacramento near Shasta, and which may be the much abused *C. Oregonensis* of Harland.

Of the Californian region, with its great area and varied features of climate, altitudes, lakes, rivers and water-courses, together with much that is unexplored, if prophesying were allowable, I would say that its present list of Testudinata will be greatly added to in the future.

A CATALOGUE OF THE BIRDS OF LOWER CALIFORNIA, MEXICO.

BY WALTER E. BRYANT.

The present paper upon the birds of the peninsula of Baja (Lower) California, Mexico, originally written as a report upon a collection made by the writer in the vicinity of Magdalena Bay in 1888, and withheld from publication in order to include the results of his contemplated field work of 1889, covering a much greater extent of territory, has, through the valuable aid of Mr. L. Belding and Mr. A. W. Anthony, been enlarged to embrace the known avi-fauna or the entire peninsula and adjacent islands.

The peninsula of Lower California, particularly the extreme southern part and Gulf side, has lately attracted considerable attention as an ornithological field. Many new species and subspecies have rewarded the undertaking of the few individuals who have visited the region, but until the past two years the researches have been conducted mostly in the vicinity of Cape St. Lucas, San José del Cabo, La Paz, and elsewhere on the Gulf shore, and for a short distance inland. With the exception of a few places in the upper part of the peninsula, the western side and interior has been practically unexplored by ornithologists.

Mr. John Xantus, in April, May and June, 1859, explored from Cape St. Lucas to San José del Cabo on the eastern side, and touched at Todos Santos on the west coast. Mr. Belding informs me that, according to his recollection, the Consul at La Paz had told him that Mr. Xantus had spent some six months there. It is possible that I have not done Mr. Xantus full justice in this paper, some of the species which are in Mr. Belding's lists are not given in his, from which it is hardly fair to assume that he (Xantus) did not observe them. Mr. Belding says: "It appears quite likely

Mr. Xantus neglected to report some very common, well-known residents, since they do not appear in his list."

Mr. L. Belding has done the most extensive work, having in 1882, made observations, limited often to a few hours or days at the most, at Cerros Island (April 14-26), Santa Rosalia Bay (April 28), San Quintin Bay (May 2-11), Los Coronados Islands (May 16 and 17), on the western coast of Lower California. At La Paz (December 15, 1881, to March 21, 1882, and three days spent at Cape St. Lucas in March, 1882), San José del Cabo (April 1, 1882, to May 17); later, La Paz was revisited (December 15, 1882), and explorations made in the Victoria and San Francisco Mountains and the vicinity of La Paz northward to about lat. $24^{\circ} 30''$, all on the Gulf side of the peninsula, and to a point about thirty miles north of Todos Santos on the Pacific coast. In the northern territory he has traveled from Tia Juana to Hansen's in May, 1884, and from San Diego to San Rafael and the northern base of San Pedro Martir in May, 1885, covering a region just north of that embraced by Mr. A. W. Anthony, who has sent me a list of the species observed by him at various times between San Fernando and El Rosario in the south to Ensenada in the north, and from Cape Colnett on the coast (lat. 31° N.) to an altitude of 11,000 feet on the mountain San Pedro Martir.

Mr. M. Abbott Frazar collected, in 1887 and 1888, on the Gulf coast from La Paz southward, and in the mountains back from the Gulf shore, and touched Loreto, and I believe Muleje. Only the new forms which he obtained have thus far been published, consequently some species not necessarily new are almost certain to be added to this list when the results of his energetic field work are known.

Under the auspices of this Society an opportunity was afforded the writer to visit the peninsula during the first four months of 1888. Previous to this time his studies of the avi-fauna of Lower California had been confined to Cerros and Guadalupe Islands. Through the courtesy of Mr. J.

P. Hale, the settlement on Magdalena Island (yclept Magdalena Bay) was made the base for operations to be conducted on the neighboring island of Santa Margarita, and also upon the peninsula.

Magdalena and Santa Margarita Islands are high and rocky, the former ending in sand hills many miles towards the north. From the top of the hills on Magdalena I was able to see the mountains of the peninsula, the weather being tolerably clear. That portion of the peninsula adjoining Magdalena Bay is sandy, level or slightly rolling, and thickly covered with numerous kinds of cacti and thorny bushes. The *estero*, which will be frequently mentioned further on, extends from the northern part of Magdalena Bay northward for more than one hundred miles; its banks are lined nearly everywhere by mangroves.

Early in March, 1888, a journey was made by boat from Magdalena Island to San Jorge, a distance of about one hundred and twenty miles. San Jorge is at the head of navigation of the *estero* just mentioned. Long before arriving at San Jorge, after the peaks of Santa Margarita and Magdalena Islands and the promontory at Cape St. Lazaro, farther north, had faded below the mangrove tops, the Sierra de La Giganta could be dimly seen with the prominent peak, La Giganta, looming above all.

From San Jorge I undertook, in the month of March, to cross the peninsula to the Gulf of California with saddle horses, one pack mule, and a Mexican for guide. The route chosen lay past the water hole of Pozo Grande and through the long and fertile cañon of Comondu, across the plains of San Julio and San Pedro and over the side of La Giganta down to Loreto on the Gulf shore. From there back to Comondu, passing around La Giganta by way of San Gabriel; but after crossing the mountains the course was changed to San Juan, a ranch half a day's ride from Loreto, and the return trip made over practically the same route. The distance from San Jorge to Comondu (by trail) is about forty

miles. The entire distance covered on the pack-mule expedition was about one hundred miles and return.

Comondu cañon is well worth special mention, it probably having never been previously visited by an ornithologist, but no description of mine can give anything like an accurate idea of the country. After traversing a good trail from San Jorge through the brush and cactus and constantly approaching the mountains we enter a broad, dry arroyo, whose sides of sandy hills gradually narrow and become more rocky. By the time the first running water is reached we are at the first ranch of Comondu, or more properly garden, for the entire cañon is divided into small gardens, one adjoining another. The rocky sides rising in places two to five hundred feet above the creek now fairly wall us in without an outlet until the town of San Miguel is approached; from this ancient settlement several trails lead to places in the surrounding country.

Comondu cañon is twelve miles or less in length and only a few hundred yards wide at any point. Above the settlement of San Miguel, in Comondu cañon, is an old mission, now abandoned. The cañon owes its fertility to two large living springs, the waters of which are conducted in open ditches through the gardens for irrigation.

The population, including the swarms of children, numbers about one thousand or less. The people are generally hospitable, but miserably poor. In the gardens are cultivated the fig, date, orange, guava and lemon, various vegetables, sugar cane, small patches of grain, corn, etc. Such an oasis could not fail to attract birds from the heated, cactus-covered and rock-strewn land about, and my expectation to find numbers of species not previously met with was fully realized. Indeed I was so pleased with the place that I returned again in April, and made additional collections, but the climate, water and food, were unfavorable for a longer stay than two weeks.

The plains of San Julio and San Pedro are grazing lands,

with a few low trees, cacti and bushes. Birds were fairly numerous in these places, but on the side of La Giganta no species worthy of note were found.

The collections which I made in 1888 and 1889 on Santa Margarita Island and Magdalena Island, and the peninsula adjoining Magdalena Bay, indicate a marked lack of the birds known as "Cape species," which do not (with a few exceptions) extend northward abundantly for any great distance on the western side of the peninsula. Whatever so-called "Cape species" were met with coastwise were found more numerous in the interior and towards the Gulf coast, which is much warmer, particularly in summer.

In addition to the following standard works consulted in the preparation of this catalogue, I have had considerable assistance from the letters of Messrs. Belding and Anthony. To Messrs. Ridgway and Belding I return my thanks for their indispensable work of determining certain of the species collected. Messrs. Anthony and Emerson have kindly loaned me specimens for comparison.

A History of North American Birds, by Baird, Brewer and Ridgway; 3 vols.

The Water Birds of North America, by Baird, Brewer and Ridgway; 2 vols.

Key to North American Birds, by Elliott Coues; 1st ed.

A Manual of North American Birds, by Robert Ridgway.

The nomenclature of the revised edition of the American Ornithologists' Union has been used, and followed in order, the names used by the early writers having been adapted to it, bringing their work down to date. In addition to being a simple catalogue, the observations of collectors which are given, are intended to show the species they have met with in certain localities, some new, others of corroborative in-

terest; and in many cases this is sufficient to generalize upon the distribution of those species throughout the peninsula and adjacent islands.

To this is added such biographical notes as were possible upon the itinerant trips, when the whole care and responsibility of the expeditions rested upon the author, whose other duties of collecting and preparing mammals, birds, birds' eggs and reptiles with wholly inadequate assistance, or none, left but little time for careful observations on habits.

I include under the term "Cape species," those which have their principal habitat on the Gulf side of the peninsula southward from about the latitude of La Paz; some of these, as hereafter indicated, occur elsewhere in more or less abundance. The term is in one sense a misnomer—as remarked by Mr. Belding: "Inappropriate, for the good reason that so few of the so-called Cape species really occur at Cape St. Lucas." The "Cape region," when alluded to, will be understood to designate in general the country just mentioned, where the principal operations of Messrs. Xantus, Belding and Frazar were conducted. I have noted the localities where species have been found, some of which are given, for instance, only from the Cape region, from which the negative conclusion that they do not occur elsewhere on the peninsula, should not be drawn, as many of them are well known to inhabit Upper California and range south into Mexico during migration.

A bibliography of the papers relating wholly or in part to the ornithology of Lower California is appended.

This year (1889) I revisited Magdalena and Santa Margarita Islands, and secured some species not found the previous year, and obtained additional specimens of the others. I was greatly disappointed, however, at failing to find upon Santa Margarita Island certain small land birds, which had been common the year before in winter, but they had all departed.

On March 15 I left Magdalena Bay, accompanied by one assistant, and the well-known botanist, Mr. T. S. Brandegee, to make a journey northward through the interior of the peninsula. As our time was somewhat limited, and the season for collecting so well advanced, I abandoned my first intention of beginning the overland journey from the country adjoining Magdalena Bay, on the east, and instead went by boat to San Jorge. From San Jorge we went inland to Comondu, where a stay of twelve days was made in order to collect in that interesting locality and negotiate for animals and men for the overland journey. Much difficulty was experienced in getting competent men and suitable animals, but at last satisfactory arrangements were made, and the trip, which I had been told by one who has had much experience traveling in the peninsula was an impossibility, owing mainly to lack of water, commenced April 3. "The start," says Mr. Brandegee, "was made with some misgivings as to the result, for we knew there was a ride of nearly five hundred miles before us through a dry, desolate, rocky and almost uninhabited region." Briefly noticing the general route taken, which was governed largely by the question of water, I shall pass to the ornithological bibliography of Lower California, and finish with an annotated list of birds known from that territory. Only species which have a valid claim to a place in the catalogue have been included; others are almost certain to be found later, as they are known to occur, at times, both north and south of the peninsula.

I made inquiry of the people with the intention of preparing a list of the Mexican names of the birds, but the information received was so contradictory, and the same name applied often to several species, and of many no name was known, that the result was very unsatisfactory.

It must be borne in mind that at the time of the overland journey from Comondu to San Quintin, the migration had practically ceased.

Parts of the trip were necessarily made with some haste, owing to a variety of causes, hence observations could only be taken from the saddle; again, when breaking or pitching camp my presence was always required, so that valuable opportunities of making observations within a radius of camp were often lost.

Returning to the itinerary of the trip, it will be scarcely necessary to more than mention the general route and topography, and notice some of the localities having more than passing ornithological interest. The very excellent map of Lower California, which accompanies this catalogue, was prepared by Mr. Brandegee for his paper upon "A Collection of Plants from Baja California, 1889," and through his courtesy I have been able to present it for the use of ornithologists.

The first of the journey was to the coast at San Gregorio and then to San Juanico, from where we traveled into the interior, keeping as much as possible in mountainous country, for the reason that more water was to be found there, and the vegetation and ornithology were more abundant and varied. At San José de Gracia is a fertile cañon much narrower and shorter than Comondu, but presenting substantially the same species but less numerous and more difficult to obtain in the thickly grown creek and crowded gardens. From San José de Gracia, the route lay over an elevated *mesa*, through characteristic Lower California vegetation of cactus and thorny bushes striving to be trees, till descending a steep trail amongst the boulders, we came to San Benito cañon, well watered and having actual trees (an ash). More time than a single day could have been spent here to advantage, but its nearness (in an air line) to Comondu and the uncertainty of the length of time it would take to reach San Quintin, together with the assurance of the guide that equally attractive localities were beyond (in which I believe he was mainly correct), caused us to reluctantly move on. From San Benito to San Ignacio

the avi-fauna was practically unchanged, Patrocinia and Jesus Maria being good localities, due partly to topography and mainly to abundant good water.

From San Ignacio to Calmalli the trail lay over rocky, volcanic *mesas*, down and up deep cañons and across rocky or sandy lowlands. Between these two notable places occurred the most important change in the avi-fauna. Belding's Yellow-throat, Brown's Song Sparrow, St. Lucas House Finch, and others, were noted here for the last time, although they may occur somewhat farther north, particularly towards the Gulf side. Soon after leaving Calmalli on the way to San Borgia, a granitic region was encountered, and certain common birds of Upper California were found which had been seen only as individuals farther south.

From San Borgia to the Gulf Coast at San Francisquito, there was noted a marked poverty of birds, the region being dry and very hot. Between these places I first saw Scott's Oriole and other more northern-breeding species. After leaving the Gulf Coast and heavy granite region, the more level country to San Fernando and El Rosario, with watering places indicated on the map, was fairly represented by birds which, by this time and in this latitude, were generally in wretched plumage. The long ride from El Rosario to water at Socorro was made partly at night, but the first Bell's Sparrow was seen this day. The region being so barren, little bird life of importance was noticed. The remainder of the journey, made on the welcome day when we arrived at San Quintin and civilization, carried us through the country which has been so well explored by Mr. Anthony that I found but little to record.

From Comondu to San Quintin, including time spent in the most favorable localities, we were just forty-nine days, and taking the mileage from place to place over very circuitous trails as it was given by the Mexicans, the aggregate was five hundred and ninety-seven miles.

Some localities mentioned in this paper are not upon Mr. Brandegee's map, therefore I will give the approximate locations that they may make more clear the remarks upon the species.

Campo is in San Diego county, Cal., about fifty miles from San Diego and one mile north of the boundary line.

Tia Juana is on the boundary line twelve miles from San Diego.

Valle Palmas is forty miles from San Diego.

Vallecita is about sixty miles from San Diego.

Guadalupe cañon is inland about twelve miles from Ensenada.

San Rafael is twenty-five miles east of Ensenada.

Hansen's Ranch is south of Campo, about seventy miles, and elevated between 6,000 and 7,000 feet.

Valle Trinidad is at the north base of San Pedro Martir, sixty miles from San Rafael, and about sixteen miles from the Gulf.

San Ramon is on the coast, twenty-five miles north of San Quintin.

San Telmo is about twelve miles inland from Cape Colnett.

San Ysidro is on the coast, about thirty-five miles south of Ensenada.

In the Cape region, Laguna, Santiago, Agua Caliente and Miraflores are not widely separated in the central part of the peninsula about midway between lat. 23° and 24° N.

Pichalique Bay is part of La Paz Bay.

Much as it is hoped that light has been shed upon the ornithology of Lower California, especially over the region traveled, the writer knows, more than anyone, of the imperfections of the present catalogue and the difficulty of treating this subject under peculiarly adverse circumstances, but ventures to hope that it may meet with favor and prove of interest and assistance to ornithologists.

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1. *Æchmophorus occidentalis* (Lawr.)

WESTERN GREBE.—Rare at Magdalena Bay where one was last seen on March 4, 1888. This species has been taken on the west coast of Mexico, but not noticed in previous lists of birds from Lower California except from Cerros Island where I saw them in January, 1885. Mr. Anthony has recently seen it in San Quintin Bay in winter.

2. *Colymbus nigricollis californicus* (Heerm.)

AMERICAN EARED GREBE.—Reported by Mr. Belding as very common at San Quintin Bay, May 10, 1881, also from Cape region. I found a female dead on the shore of Cerros Island in January, 1885. They were common along the shores of Magdalena Bay, particularly at Magdalena Island. They were seen about the landing swimming in compact groups of from one to two dozen birds, the entire

flock would dive almost simultaneously and appear again in a more scattered bunch a short distance away. Their tameness made them objects to be stoned by Mexican boys who occasionally killed and wounded some.

3. *Colymbus dominicus* Linn.

ST. DOMINGO GREBE.—“Very common at San José, Miraflores and Santiago, in the winter of 1882-83, but not recognized the previous winter.” (Belding).

4. *Podilymbus podiceps* (Linn.)

PIED-BILLED GREBE.—Observed only by Mr. Belding from the Cape region. At San Quintin Bay Mr. Anthony has seen them in winter and about the kelp on the coast.

5. *Urinator imber* (Gunn.)

LOON.—Two were seen by Mr. Belding at La Paz, January 27, 1883, and one was shot at San Quintin Bay in May.

6. *Urinator pacificus* (Lawr.)

PACIFIC LOON.—An adult specimen in breeding plumage was found dead on the shore of Guadalupe Island by Dr. Palmer in 1875.

7. *Cerorhinca monocerata* (Pall.)

RHINOCEROS AUKLET.—Two specimens were taken by myself in January, 1885, at the southern end of Cerros Island.

8. *Ptychoramphus aleuticus* (Pall.)

CASSIN'S AUKLET.—Mr. Anthony has found it nesting as far south as San Geronimo Island. I have recorded them from Cerros Island where they were rare in January, 1885.

9. *Brachyramphus hypoleucus* Xantus.

XANTUS'S MURRELET.—First taken from the Cape region by Mr. Xantus, but not recorded from the Pacific coast of the peninsula. Dr. Cooper, however, notes it from Santa Barbara Island, Alta California, where it was breeding, and Col. N. S. Goss collected two specimens near San Diego, just north of the boundary line.

10. *Brachyramphus craveri* (Salvad.)

CRAVERI'S MURRELET.—From Cape St. Lucas by Mr. Xantus. Also given from Natividad Island, which is on the west coast near lat. 28° N.

11. *Larus occidentalis* Aud.

WESTERN GULL.—Tolerably common at Magdalena Bay in winter, and northward along the western coast. Said to breed upon the Todos Santos Islands off Ensenada, and also upon the Island of San Pedro Martir (Goss). Noted from the Cape region also.

12. *Larus argentatus smithsonianus* Coues.

AMERICAN HERRING GULL.—Recorded by myself from Cerros Island.

13. *Larus californicus* Lawr.

CALIFORNIA GULL.—Said by Mr. Belding to be moderately common at San José del Cabo. I obtained immature birds at Magdalena Bay in the winter.

14. *Larus delawarensis* Ord.

RING-BILLED GULL.—Recorded from the Cape region by Mr. Belding, and from San Quintin Bay by Mr. Anthony, in winter.

15. *Larus heermanni* Cass.

HEERMANN'S GULL.—The most common species of *Laridae* met with at Magdalena Bay, nearly all being in immature plumage. They attend in large numbers the flocks of pelicans and cormorants when fishing. They occur commonly along both coasts, breeding on the islands.

16. *Larus philadelphia* (Ord).

BONAPARTE'S GULL.—Observed only by Mr. Belding from the Cape region.

17. *Sterna maxima* Bodd.

ROYAL TERN.—Reported from Cape region by early observers and from northwest coast in winter, by Mr. Anthony. Mr. Belding found it common at Cerros Island in April, rare in May.

18. *Sterna elegans* Gamb.

ELEGANT TERN.—Numbers were seen around Magdalena Bay in 1888. This year I obtained five adult plumaged birds at Magdalena.

19. *Sterna forsteri* Nutt.

FORSTER'S TERN.—Recorded from Cape region by Mr. Belding, and given from northwest coast by Mr. Anthony.

20. *Diomedea nigripes* Aud.

BLACK-FOOTED ALBATROSS.—Mr. Anthony reports seeing them frequently a mile and more off shore. I caught four with hook and line when sailing from Guadalupe Island to Ensenada.

21. *Diomedea albatrus* Pall.

SHORT-TAILED ALBATROSS.—An adult plumaged bird was seen on the water of the *estero*, near one of the openings to the ocean, April, 1888. When sailing in a schooner from Guadalupe Island to Ensenada in April, 1886, five birds followed the boat, at times sweeping away to a distance on either side and then returning to cross or follow the wake, one was an immature plumaged bird of this species.

22. *Puffinus gavia* (Forst.)

BLACK-VENTED SHEARWATER.—From Guadalupe Island, where I found one dead. Mr. Anthony says it is abundant along the northwest coast.

23. *Puffinus griseus* (Gmel.)

DARK-BODIED SHEARWATER.—Recorded by Mr. Xantus from Cape St. Lucas, August 18.

24. *Halocryptena microsoma* Coues.

LEAST PETREL.—Found at San José del Cabo in May by Mr. Xantus.

25. *Oceanodroma macrodactyla* (Bryant).

GUADALUPE PETREL.—Known only from Guadalupe Island.

26. *Oceanodroma melania* (Bonap.)

BLACK PETREL.—A single specimen taken by Mr. Xantus from the Cape region.

27. *Phaethon æthereus* Linn.

RED-BILLED TROPIC BIRD.—Has been recorded from Cape Colnett in September, 1888, by Mr. Anthony and also from fifty miles north of Cerros Island. They were occasionally seen by myself at Magdalena Bay in January, 1888. Mr. Xantus does not give this species in his list. Mr. Belding obtained one at Espiritu Santo Island, February 1, 1882. They breed on certain islands in the Gulf of California, San Pedro Martir (Goss) and Santa Isabel (?).

28. *Sula gossii* Ridgw.

BLUE-FOOTED BOOBY.—Breeds on certain islands in Gulf of California; San Pedro Martir (Goss).

29. *Sula sula* (Linn.)

BOOBY.—An immature bird was shot near Pichalincue Bay in January, 1883, by Dr. H. Ten Kate, and is given in Mr. Belding's second catalogue as *Sula leucogastra* (Bodd.)

30. *Sula brewsteri* Goss.

BREWSTER'S BOOBY. — Same remarks as under *S. gossii*.

31. *Phalacrocorax dilophus albociliatus* Ridgw.

FARALLON CORMORANT.—Presumed to be the cormorant mentioned by Prof. Baird as "*Graculus dilophus* ? Gray.—Immature," in his notes on the collection made by Mr. Xantus at Cape St. Lucas. And reported later from Cape region by Mr. Belding as *P. dilophus cincinnatus* (Brandt). At Cerros Island he says: "A colony of about one hundred of these cormorants were breeding on almost inaccessible cliffs which rose perpendicularly from the water. Seven nests, examined from above, contained either three or four eggs each. Thousands of these species were observed at Elida and St. Martin's Islands, and San Quintin Bay." The numbers of these birds which congregate at Magdalena

Bay is almost incredible. Many mornings I have been attracted by the noise of thousands fishing some distance off shore and have watched through a glass the dense, dark mass as they passed a given point. Those half a mile or more in the rear came flying forward in platoons and alighted at the head of the broad line, making the water turbulent with commotion while their numbers were being constantly augmented by the arrival of stragglers from the sides and rear. Mingled with the myriads of cormorants, were often many California brown pelicans plunging for fish, while above all hovered Heermann's gulls, robbing at every opportunity. To all appearances, they were following a great school of fish, astounding numbers of which must be daily consumed by these voracious feeders.

In one part of the bay was a low, sandy island formerly covered by a light deposit of guano. This low land was the common gathering place for many water birds and the principal headquarters for cormorants, it having been, I was told, a nesting place, but the collecting of guano had caused them to desert it as a breeding resort. Passing close by one day in a sail boat, the shore line and in places some distance inland was seen to be actually black with closely crowded cormorants. As the boat approached, they hurried pell-mell into the water where a few dived and others took flight. Those at a distance from the shore flew or ran awkwardly to the water's edge.

Cormorants were seen along the *estero* to San Jorge, and in April, 1889, on the lagoons in lower Purisima cañon, but no nesting colonies were found except on Santa Margarita Island. On that island they built upon mangrove bushes bordering a small lagoon. This lagoon was about eighty yards in width at the widest part, and five hundred yards or less in length, extending in a general direction north and south; upon the west side only were built nests of the frigate pelican.

Many of the cormorant's nests, in fact all of those first

constructed, were upon the same mangroves as were used by the frigate pelicans, but only the highest branches were appropriated by the cormorants. Later in the season the mangroves on the opposite (east) side of the lagoon were clustered with nests of cormorants.

When I first visited this colony (January 14, 1888) a few of the nests contained eggs, and scores of others were in varying stages of construction. The great rush of cormorants to Santa Margarita Island did not occur until April or latter part of March.

The cormorant's nests were easily distinguished from those of the man-o'-war birds by their higher situation upon the mangroves and by their greater size, particularly the height. Composed of small sticks, they formed a pile a foot, more or less, high, a slight depression on top was lined with seaweed, two or three colors being sometimes found in the same nest, giving an odd effect in contrast with the eggs. The sea-weed is gathered along shore, and perhaps also obtained by diving, as I was led to suppose from watching some of the birds. I noticed a cormorant upon the water with something in his bill, evidently sea-weed for nest lining, which he was endeavoring to bring to shore, but being harassed by a number of man-o'-war birds which hung over him, it was only after many attempts and after all but one of the birds had left him, that he finally got fairly on the wing and gained the nest. As he swam shoreward with the sea-weed, one after another of the tormentors would swoop gracefully down and attempt to seize the weed, but it was dropped in time to save it from the robbers and then regained by diving. Sometimes the cormorant would go entirely under to avoid the birds, taking the sea-weed with him. Again, when there was a little lull in the frequency of attacks, he would take wing, but would at once drop to the water and dive when overhauled by one of the man-o'-war birds. Six times I saw him get fairly under full headway only to go down each time under the attack of

a frigate pelican which overtook him with apparently no effort. Whenever chased, a cormorant squawks lustily and tries to avoid his pursuer by turning to one side, but the pelican keeping close behind with scarcely a motion of his wings, soon causes him to drop the fish which he may have and which is quickly snatched from the surface before it sinks.

When on an excursion up the long *estero*, I saw for the first time the doubted spectacle of a cormorant sailing. The bird was a solitary individual, about a gun-shot above the water; with wide-spread wings he covered in flight nearly a hundred yards without flapping, but of course rapidly descending. Since reading, years ago, Longfellow's poem "The Skeleton in Armor," I have watched hundreds of these birds flying, to note, if ever, * * * "with his wings aslant, sails the fierce cormorant," and even now incline to think that some other bird was had in mind or very large margin must be allowed a natural history reference.

Most of the cormorants' nests could be reached by careful climbing and by distributing one's weight upon different branches and partially supporting by the arms. It was impossible, even when the tide was out, to walk on the ground among the trees, or more properly bushes, for they were hardly trees in size, hence to reach the nests I was obliged to climb through and over the mangroves. Many times in my eagerness and haste to get over as much ground, or rather as much mangrove as possible, I broke through the tangle, seldom falling entirely to the ground, but lodging midway in a peculiarly helpless position from which it required time and care to clear myself.

Some of the nests contained fresh eggs as early as January 14, and I was told they had been taken by the people for food two weeks before.

I did not notice the peculiarity mentioned by Dr. Cooper that the eggs would not coagulate by boiling, for although

I ate many, I believe none were boiled. Some which were broken by my falling amongst the mangroves were cooked upon a piece of iron laid on the fire, and these certainly acquired firmness enough to bite on, something of a gelatinous consistency, if I remember rightly, and although unsalted, I recollect that they relished at the time. It makes a wonderful difference in one's opinion of such things whether they have dined well for a day or two preceding the experiment or not. The eggs were usually four in number, sometimes three, and in one nest five were found.

32. *Phalacrocorax penicillatus* (Brandt).

BRANDT'S CORMORANT.—Reported from the Cape region and Los Coronados Island by Mr. Belding; at San José del Cabo and Cerros Island, he mentions it as abundant. They were found at Magdalena Bay and for many miles up the *estero*.

33. *Phalacrocorax pelagicus resplendens* (Aud.)

BAIRD'S CORMORANT.—Seen near Todos Santos Islands upon one occasion in May by Mr. Anthony.

34. *Pelecanus erythrorhynchos* Gmel.

AMERICAN WHITE PELICAN.—A flock of white pelicans was reported to me from a little more than one hundred miles northward from Magdalena, on the Pacific coast. Observed at the Cape region by Mr. Xantus. ("San José del Cabo, January, February; Cape St Lucas, no date.") Two were seen at La Paz, February 17, 1883, by Mr. Belding.

35. *Pelecanus californicus* Ridgw.

CALIFORNIA BROWN PELICAN.—Abundant at Magdalena Bay and for many miles up the *estero*. They often fished in company, in which case they would be attended by a large number of man-o'-war birds that kept continually swooping down to rob them of the fish caught. I did not see them actually succeed, for the pelicans are very cautious

when they seize a fish, and hold it by the tip of their long bill under water for a few seconds until a favorable moment to swallow it.

At times when the bay was perfectly smooth, white water could be seen here and there thrown several feet into the air by the fishing operations of pelicans, so far away that the birds would not be noticed. With a glass I have watched them when fishing close to shore—solitary birds undisturbed by gulls or frigate pelicans. With slow, laborious strokes and bill extended, he rises to a suitable height to enable him to see the fish beneath the rippled surface, then flying with measured beats as though he meant to go miles away, a fish is suddenly discovered near the surface, the wings partially collapse, and with a heavy plunge, a loud splash as he strikes, and the water flies upward. It is all over in a moment, the bird shakes his plumage, adjusts the wings, and sitting sedately upon the water with the bill drawn back close to the neck, the tip just below the surface, holding a wiggling fish for a few moments, then with an upward toss of the bill, the fish disappears in the pouch, there is a slight rustle of the plumage, a satisfactory shake of the tail and the fisher is ready for the next. Rising heavily with an inexpressibly weary air, he perhaps flies but a few yards and is only a little distance above the water when another fish is seen. Plunging obliquely this time it is taken, and the same maneuver gone through again. Varying with the smooth or ruffled state of the surface, or perhaps the depth at which the fish are swimming, the pelicans rise to varying heights. The momentum of the fall, or the depth which the fish may be, often takes them entirely under. This is a most interesting sight to witness, when a high plunge carries them under, sending white water high into the air and concealing the bird, then suddenly he bobs up like a cork and shakes the water from his plumage. Possibly the fish is not seen until it is directly beneath or has even been passed, then the most beautiful plunge is seen,

for with the quick closing of the wings, they round to and fall to one side or, as it sometimes actually appears, in the opposite direction from which they were flying.

In rare instances the fish escaped (but not if once caught) and then the disappointed pelican would spend but little time at the spot where he had failed, but once more on the wing, begin scanning the bay for food. In traveling from place to place, several fly together in a line; usually the leader stops flapping first, then each in order sails with motionless wings; the flapping of the leader's wings is a signal followed in rotation by each of the others. When journeying in this way they generally fly close to the surface, so close as to all but touch the waves with their wings.

Great flocks congregate on sandy shores to rest, assuming various positions. Continually amongst the crowd will be seen, here and there, a head and long bill thrown into the air as though yawning but more probably to swallow a fish concealed in the pouch. The peaceful scene will be turned into one of confusion as a boat sweeps into sight and bears down on them. They commence to move uneasily about, some waddle to the water and begin swimming away, others, after a few awkward jumps, take wing from the beach and the whole flock goes trooping away to another sandspit followed by a few gulls and deserted by the cormorants which had gathered near them.

I did not find a breeding colony, but was told that they lay on the southern end of Santa Margarita Island. Young birds out fishing for themselves were seen in April. Mr. Anthony found a colony of about five hundred breeding on San Martin Island, and according to Mr. A. M. Ingersoll, they nest also on Los Coronados Islands. A Mexican guide who accompanied me on some of my excursions along the *estero*, and who was quite observant in points of natural history, related to me in all sincerity an interesting tale of pelicans being killed by striking submerged rocks when

fishing in shallow water. The dead birds he had reference to were probably those mentioned by Mr. Belding as having been "nearly exterminated by disease in February, 1882," at the Cape region. Mr. Anthony observed a pelican at San Martin Island that had the upper mandible splintered "so that it hung down upon her breast in two or three long strips," supposed to have been caused by striking a hidden rock when plunging for fish.

36. *Fregata aquila* (Linn.)

MAN-O'-WAR BIRD.—The first birds sighted as we neared land approaching Magdalena Bay, were the frigate pelicans which are known to some as "storm birds." The superintendent of one of the guano islands in the Gulf told me that the Yaqui Indians whom he employed, regarded the presence of many of these birds in their vicinity as the certain forerunner of a storm, and would refuse to work in the boats on such days. The Mexicans call them "*tijeras*" (scissors), from the scissor-like movements of their two long outer rectrices. When seen for the first time at a distance, the tail might be mistaken for long legs extending behind in the manner of a flying heron.

Going over to Santa Margarita Island from Magdalena Island on January 14, 1888, I saw many of these birds on the wing, some of them idly floating at an immense height, so high as to be almost invisible, higher than I have ever seen hawks (*Buteo*) sailing. Anchoring near shore, we waited until morning before landing. From the boat, the mangroves spoken of under the subject of cormorants, could be seen fairly covered with birds and a long whirling column of others on the wing extended far skyward. Birds were continually coming and going from this place, but none passed within gun-shot of the boat, and during my excursions by boat, more than five hundred miles in all, no man-o'-war bird came near enough for a shot. On the wing they sail much of the time, but when they flap the strokes of their long wings are slow and willowy. They are by far the most

graceful birds when flying that I have ever seen. In picking food from the water, they scarcely disturb the surface: descending airily, the object is taken in passing in such a manner that at the moment of seizure the bird's head is bent under, then quickly throwing the head upwards, they rise again, silent and graceful. I have seen flocks of fifty or more circling over the land a mile from water and continually descending to the ground, bushes or cacti from which they were evidently picking food, possibly land snails, although I could not approach near enough to see even with a field glass that any sizeable objects were taken. The stomachs of the specimens examined were either empty or contained slender parasitic worms about 40 mm. long. The principal feeding ground was probably at sea. They were not seen to light anywhere except upon their nests or the mangroves. In order to study more closely the habits of these birds, I camped for a few nights upon the sand ridge between the bay and lagoon.

The birds were more quiet after dark, but some sounds could be heard throughout the entire night. At the first faint appearance of dawn, a continuous exodus would commence from the rookery, some of the birds flying high over the island more than four miles to the sea. The mangroves bordering upon the western side only of the lagoon were used for nesting sites, a partial vacancy midway seemed to separate two colonies. The mangroves being higher at the edge of the water, the nests were placed at heights varying from five to twelve feet. Procuring a small boat and the services of a Mexican, I skirted the edge of the lagoon for specimens of eggs and photographs of the rookery, showing the birds in all attitudes. They were usually quite tame but seemed more afraid of me when in the boat than when climbing over and through the mangroves, probably because in the first instance I was more exposed to view. Several birds were caught by hand and some others struck down with an oar as they pitched from the nest to fly past. Upon the

water they beat their wings helplessly and were with great difficulty able to rise. In a few cases a bird would miss getting on the wing by coming in contact with another and fall helplessly amongst the branches from which they were scarcely able to extricate themselves. They seemed bewildered by my presence, and did not attempt any resistance. Those which were taken alive were not given an opportunity to use their beaks if they had been so disposed.

There was a strong wind blowing at the time I first visited the rookery, and standing twenty to thirty yards to windward, I had a magnificent view of the birds as they rose from the mangroves and nests. Those on the wing poising themselves upon the breeze, now rising and falling and sweeping in and out of the crowded flock, not clamorous as I expected, but surprisingly quiet, for although hundreds were on the wing, not half the number in sight, they were not what I should call noisy, even for sea-birds. They were not filthy like some sea-birds when on the wing, so that I escaped almost unmarked from their excrement. When standing to leeward, a hundred yards from the rookery a smell of guano was very noticeable, which became stronger in April, by which time many of the nests that had not been molested, contained young. The report of a gun in the vicinity would start hundreds more upon the wing, but I believe not those which were sitting. At the same time there would be a louder outcry lasting but a short time. The most noticeable sound and the loudest was from those birds which I supposed were sitting; it resembled somewhat the squawking of a chicken when caught, but more guttural. Another sound was a clear rattle like the clacking of hard wood "bones;" it is made by the quick snapping of the bill. A third note was a prolonged guttural squawk or croak.

The nest constructed by the frigate pelican is small, many of them smaller than a medium sized dinner plate.

At a short distance from the rookery the nests were not

noticeable, probably because most of them were covered by birds. They were composed of small sticks and branches, and occasionally a bit of sea-weed or marsh weed laid anywhere on the mangrove branches that would bear the required weight with that of the sitting bird. Nests which had apparently been in use for more than one rearing were usually considerably thicker and some were heavily incrustated with guano, making the surface so smooth that it did not seem as though the egg would remain on if in the least disturbed. A single egg is laid which is chalky white in color, shaped much like eggs of the *Laridæ* but perhaps a trifle more pointed at the small end. The average measurement of twenty specimens is 68.7×46.9 , the largest and smallest examples measure 73.5×47 ; 72.5×49 ; 64.5×46 ; 67×45 millimetres respectively.

Eggs were collected for food by the Mexicans during the latter part of December, and owing to repeatedly taking them, some were found February 13, 1888, which were in different degrees of incubation, others were quite fresh. The Mexicans had fresh eggs April 27 which they had recently taken.

The first young were seen in the middle of February; they had been hatched sometime earlier, for although some were nearly naked, others had a full covering of snowy down and the dark scapular pin feathers. They cling tightly to any object that touches their feet, and in this way are probably enabled to keep upon the nest when agitated by a high wind. A downy young which I took away alive would not take food held to it, but had to be fed by crowding the food so far down its throat that it had to swallow it. The little thing was very helpless and kept up an almost continual complaining from the time that it left the nest.

The food of this species as far as was observed, consisted wholly of fish. Disgorged masses of fish were found upon some of the nests, and upon the ground below I sometimes saw small fish entire. Once a full grown bird, when I

approached rapidly in the skiff, went through several contortions and retchings and disgorged a fish before flying. I saw one of the adult females apparently feeding a male which was on a nest; she hovered above him, while with raised head and partly spread wings, he trembled like a young pigeon when being fed, at the same time he made the rattling sound previously mentioned, and seemed to be taking regurgitated food. Observations on the persecution of cormorants by man-o'-war birds have been given in the notes on the cormorants.

Three distinct plumages of the full grown birds were seen; the adult male and female and a few immature full grown birds having the head entirely white. A comparison of colors made in the field is here given, they having been noted at the time from fresh specimens compared with Ridgway's "Nomenclature of Colors."

Adult male.—Iris, chestnut; feet and legs, black; gular pouch in dead specimens, orange chrome; when inflated in the living birds it appears brighter and more of a vermilion color; bill, black.

Adult female.—Iris, chestnut; feet and legs, deep flesh color; gular, heliotrope purple.

Immature.—Iris, chestnut; eyelids, gula and feet, pale blue; feet coated with guano.

The gular pouch of the males is capable of great distention, appearing when full blown, like toy balloons. Some were seen on the wing with inflated gular which seemed almost bright scarlet in color.

Mr. Belding notes this species abundant at the Cape region; they certainly were in swarms at the rookery on Santa Margarita Island. They were seen occasionally along the *estero*, but more at the lagoon in lower Purisima cañon. At this place I saw some birds drop upon the water for a moment in feeding, somewhat like a tern, the wings being kept

raised. Dr. Palmer tells me that he saw many of them about the southern end of San Pedro Martir Island.

37. *Merganser serrator* (Linn.)

RED-BREASTED MERGANSER.—Tolerably common during March in the long *estero*, and were also seen in April. Not previously noted from Lower California, but Mr. Belding tells me that he saw a number in San Quintin Bay in May, 1881, and shot one specimen.

38. *Lophodytes cucullatus* (Linn.)

HOODED MERGANSER.—Recorded by Mr. Xantus from San José del Cabo in February, and by Mr. Belding from La Paz.

39. *Anas boschas* Linn.

MALLARD.—Noted from San José del Cabo in December by Mr. Xantus, and from the Cape region and San Rafael Valley by Mr. Belding, at the latter place, breeding.

40. *Anas strepera* Linn.

GADWALL.—Found at San José del Cabo in December and February by Mr. Xantus. At San Rafael Valley Mr. Belding saw several pairs.

41. *Anas americana* Gmel.

BALDPATE.—On March 9, 1888, a flock of eight was seen in the creek at Comondu; a few others were found at San Juan, on the Gulf side near Loreto some days later, and again met with in 1889, at the water hole, San Raimundo. Mr. Belding reported a flock of about a dozen from San José del Cabo, May 17, 1882.

42. *Anas carolinensis* Gmel.

GREEN-WINGED TEAL.—Observed by Messrs. Xantus and Belding at the Cape region. Mr. Anthony observed it as high as 9,000 feet altitude in winter.

43. *Anas discors* Linn.

BLUE-WINGED TEAL.—At San José del Cabo Mr. Belding found this species mated and common April 1 to May 17, 1882. Mr. Anthony saw a few at San Ramon in April.

44. *Anas cyanoptera* Vieill.

CINNAMON TEAL.—A few were seen in Purisima cañon and one female shot from a mixed flock of ducks, April 5, 1889. Mr. Belding found them mated at San José del Cabo, where they were rare, April 1, and were there as late as May 17, 1882. Many pair were nesting at San Rafael Valley.

45. *Spatula clypeata* (Linn.)

SHOVELLER.—Seen at Comondu and lower Purisima cañon in April, 1889. Mr. Belding states that at San José del Cabo they were mated April 1 to May 17, 1882. Several were seen at San Rafael Valley by May 12.

46. *Dafila acuta* (Linn.)

PINTAIL.—A few individuals were noticed April 5, 1889, at lower Purisima cañon. Messrs. Xantus and Belding found them at the Cape region in winter, and the latter observed about a dozen, including both sexes, at San Rafael Valley, May 12.

47. *Aythya americana* (Eyt.)

REDHEAD.—An adult male was shot at La Paz, February 12, by Mr. Belding, who also saw a female at San Rafael, May 12, and a male at Trinidad, May 14.

48. *Aythya affinis* (Eyt.)

LESSER SCAUP DUCK.—A number of small flocks were seen on Magdalena Bay and some distance along the *estero* in 1888. In 1889, I shot specimens at lower Purisima cañon and at a water hole, San Raimundo. Reported to be rare at the Cape region by Mr. Belding, who shot several at San Rafael, May 12. I observed a few on shallow inland water at Ensenada, December, 1885.

49. *Aythya collaris* (Donov.)

RING-NECKED DUCK.—Given by Mr. Belding as rare at the Cape region.

50. *Charitonetta albeola* (Linn.)

BUFFLE-HEAD.—On April 5, 1889, I shot a male at lower Purisima cañon. Mr. Anthony found it common at San Quintin in winter.

51. *Oidemia deglandi* Bonap.

WHITE-WINGED SCOTER.—Noted from San Quintin Bay in winter by Mr. Anthony.

52. *Oidemia perspicillata* (Linn.)

SURF SCOTER.—Common at Ensenada. In swarms at San Quintin Bay in winter, according to Mr. Anthony.

53. *Erismatura rubida* (Wils.)

RUDDY DUCK.—Mr. Belding rates this species as very common at and south of La Paz. Specimens were shot at the water hole at San Raimundo, and I believe I saw them also at lower Purisima cañon in April, 1889. Found nesting at lat. 31° N. by Mr. Anthony.

54. *Anser albifrons gambeli* (Hartl.)

AMERICAN WHITE-FRONTED GOOSE.—Recorded from Guadalupe Island by myself, and Mr. Belding tells me that a hunter (Mr. Fisher) shot one out of a group of four at Los Martires, between La Paz and San José del Cabo.

55. *Branta canadensis hutchinsii* (Sw. & Rich.)

HUTCHINS'S GOOSE.—A few were seen in San Rafael Valley in the fall by Mr. Anthony.

56. *Branta nigricans* (Lawr.)

BLACK BRANT.—Reported from San Quintin Bay in May, 1881, by Mr. Belding, and at Cerros Islands in January, 1885, by myself. Mr. Anthony says they swarm in San Quintin Bay until May 15.

57. *Dendrocygna fulva* (Gmel.)

FULVOUS TREE-DUCK.—Reported numerous in autumn at San Rafael, where Mr. Belding's companion, Mr. Walter Morgan, shot several dozen.

58. *Olor columbianus* (Ord).

WHISTLING SWAN.—Mr. Anthony mentions a swan shot at San Rafael which he supposes to be this species.

59. *Guara alba* (Linn.)

WHITE IBIS.—From the Cape region, noted only by Mr. Belding. They were tolerably common at Magdalena Bay, associated in small flocks and making long flights in line from one feeding ground to another. At Santa Margarita Island and along the *estero* they were usually seen roosting upon the mangroves. A few immature plumaged birds were seen.

60. *Plegadis guarana* (Linn.)

WHITE-FACED GLOSSY IBIS.—A flock was seen at San José del Cabo in April and May by Mr. Belding.

61. *Tantalus loculator* Linn.

WOOD IBIS.—A pair was seen at San José del Cabo in April and May, 1882, by Mr. Belding, and were more common at La Paz in winter.

62. *Botaurus lentiginosus* (Montag.)

AMERICAN BITTERN.—“Cape Saint Lucas, November 4; San José del Cabo, November 29, 30.” (Ridgway in list of Xantus's birds.) Mr. Belding mentions it as moderately common in winter south of lat. 24° 30'.

63. *Ardea herodias* Linn.

GREAT BLUE HERON.—Rare at Magdalena Bay. A single pale specimen was taken on Santa Margarita Island. Mr. Belding mentions it as rare at San José del Cabo.

64. *Ardea egretta* Gmel.

AMERICAN EGRET.—Tolerably common about Magdalena Bay. Fed in small groups or singly along the beach. They fly for a long distance from one feeding ground to another, keeping but a short distance above the water. In April, 1888, they became more common in places along the *estero* and were seen collected on the mangroves above the water.

One night while navigating the *estero*, I saw a large flock which may have been a nesting colony, but it was too dark to investigate and by daylight they were far behind. The colors of a fresh specimen shot at Magdalena Island, February 12, 1888, were: iris, canary yellow; lores and eyelids, chrome yellow; ophthalmic region, light glaucous green; feet and spots on heels, light chrome yellow.

This species also occurs at the Cape region. (Belding.)

65. *Ardea candidissima* Gmel.

SNOWY HERON.—Rare. Seen on a few occasions along the *estero* and at San Juan, also at Comundu. Several seen at San José del Cabo by Mr. Belding.

66. *Ardea rufescens* Gmel.

REDDISH EGRET.—Earlier explorers have found this egret at various places at the Cape region. They were tolerably common at Santa Margarita Island, which was probably a night roosting place for many amongst the mangroves. Ten were seen in one flock on February 14, 1888. A female shot that day contained twenty-eight fish, measuring from 25-90 millimetres in length; most of them were 65-75 millimetres long.

67. *Ardea tricolor ruficollis* (Gosse).

LOUISIANA HERON.—Observed from the Cape region only, by Mr. Belding. In March, 1888, I saw two flying above the mangrove tops of the *estero*. In March, 1889, a small flock was seen flying from the lagoon on Santa Margarita Island.

68. *Ardea virescens frazari* Brewst.

FRAZAR'S GREEN HERON.—A few seen at Santa Margarita Island and along the *estero*, also at Comundu. No specimens were secured, but a skin in the collection of the California Academy of Sciences from Magdalena Bay, is probably referable to this form. Noted from the Cape region by Mr. Belding as the Green Heron, and specimens collected later by Mr. Frazar.

69. *Nycticorax nycticorax naevius* (Bodd.)

BLACK-CROWNED NIGHT HERON.—A few were seen at Santa Margarita Island in the month of February, 1888. Observed at the Cape region by Messrs. Xantus and Belding.

70. *Nycticorax violaceus* (Linn.)

YELLOW-CROWNED NIGHT HERON.—Common about Magdalena Bay. Many night herons were nesting in April, 1888, in a mangrove thicket bordering the long *estero*; they all appeared to be of this species. When alarmed by the passing of the sail-boat, they left the bushes and collected along the water's edge, where I counted eighty. Mr. Belding gives this species as occurring at the Cape region.

71. *Grus mexicana* (Müll.)

SANDHILL CRANE.—Mr. Belding has seen them in Tia Juana Valley in winter and spring.

72. *Rallus beldingi* Ridgw.

BELDING'S RAIL.—Found by Mr. Belding upon Espiritu Santo Island, and at La Paz. Rails were heard in mangrove swamp on Santa Margarita Island, Magdalena Island, and for one hundred and twenty miles up the *estero*. They were clapper rails, but whether *R. beldingi* I cannot say.

73. *Rallus obsoletus* Ridgw.

CALIFORNIA CLAPPER RAIL.—Found at San Quintin Bay by Mr. Belding, also by Mr. Anthony, who mentions it as a common resident of all salt marshes.

74. *Rallus virginianus* Linn.

VIRGINIA RAIL.—I believe this rail has not been previously recorded from Lower California, although occurring at San Diego and in Mexico. Mr. Anthony has taken it at San Quintin in winter.

75. *Porzana carolina* (Linn.)

SORA.—Rarely seen in the vicinity of La Paz by Mr. Belding, but found in a marsh at San José del Cabo April and May. Mr. Anthony has occasionally seen them in spring along the coast north of lat. 31°

76. *Fulica americana* Gmel.

AMERICAN COOT.—Observed at the Cape region by Messrs. Xantus and Belding. Mr. Anthony found them very abundant all winter in the northern portion of the peninsula, and breeding where fresh water was in sufficient quantity. He found a pair nesting on San Pedro Martir in May, at an altitude of 8,200 feet. In 1888 I saw one at Comondu in company with ducks; a few more were found at San Juan, and in April, 1889, at lower Purisima cañon, where they were probably breeding.

77. *Crymophilus fulicarius* (Linn.)

RED PHALAROPE.—From the steamer I have occasionally seen small flocks of phalaropes upon the water off the coast of Lower California. Mr. Anthony has noticed large flocks far out at sea from the last of July until the first of November, and assigns them to this species. Mr. Belding tells me that he shot two in La Paz Bay.

78. *Phalaropus lobatus* (Linn.)

NORTHERN PHALAROPE.—Mr. Belding secured three specimens at San Rafael, May 16.

79. *Phalaropus tricolor* (Vieill.)

WILSON'S PHALAROPE.—Mr. Belding obtained one specimen at San José del Cabo, where it was rare.

80. *Recurvirostra americana* Gmel.

AMERICAN AVOCET.—Has been reported as not common from near La Paz by Mr. Belding.

81. *Himantopus mexicanus* (Müll.)

BLACK-NECKED STILT.—Mr. Belding found the stilt uncommon near La Paz. Mr. Anthony has seen them during migrations about fresh water on the northwestern part of the peninsula.

82. *Gallinago delicata* (Ord).

WILSON'S SNIPE.—Mr. Belding found them rare in the vicinity of La Paz, and Mr. Xantus at San José del Cabo,

November 23; Mr. Anthony in the region embraced in his explorations (San Fernando to Ensenada). I saw a few at Comondu in March and April, 1888.

83. *Macrorhamphus scolopaceus* (Say).

LONG-BILLED DOWITCHER.—Noted by Mr. Anthony from northwestern coast region. They were common at Magdalena Bay, where small flocks associated with willet and godwit; they were more plentiful along the *estero* on mud flats. A male which was collected March 7, 1888, had commenced to assume the summer plumage.

84. *Tringa minutilla* Vieill.

LEAST SANDPIPER.—Recorded from Todos Santos (west coast) by Mr. Ridgway in list of specimens collected by Mr. Xantus. Mr. Anthony noticed them at San Quintin Bay. At Magdalena Bay they were seen in small flocks and specimens taken; also at lower Purisima cañon.

85. *Tringa alpina pacifica* (Cooper).

RED-BACKED SANDPIPER.—I am not sure that I saw any of this species at Magdalena Bay, and it does not appear on the lists of either Messrs. Xantus or Belding from the Cape region; the latter, however, mentions it as abundant at San Quintin Bay, May 2, 1882, but rare by May 10.

86. *Ereunetes occidentalis* Lawr.

WESTERN SANDPIPER.—Recorded from the Cape region by Mr. Belding, and at San Quintin Bay where it was abundant May 2, 1882, but rare by May 10, and on the northwestern coast Mr. Anthony has found them. At Magdalena Bay I saw a few in a flock of *T. minutilla*.

87. *Calidris arenaria* (Linn.)

SANDERLING—One of the thirty-four species collected at the Cape region only by Mr. Xantus. Mr. Anthony found them very abundant all winter at San Quintin Bay. In January, 1885, I collected specimens on the south end of Cerros Islands, and obtained a single bird on Santa Margarita Island March 4, 1889, from a flock of *Ægialitis nivosus*.

88. *Limosa fedoa* (Linn.)

MARbled GODWIT.—Mr. Anthony considers them very abundant in winter and a few were even seen all summer. Large flocks of godwit were met with in the *estero* northward from Magdalena Bay as late of April 21, 1888. One evening a flock numbering towards one hundred had huddled on a strip of sand at the edge of the mangroves preparatory to spending the night, but were frightened away by the boat.

89. *Limosa lapponica baneri* (Naum.)

PACIFIC GODWIT.—Found at La Paz by Mr. Belding.

90. *Totanus melanoleucus* (Gmel.)

GREATER YELLOW-LEGS.—Mr. Belding found this species very common in winter north of La Paz. They were tolerably common along the *estero* and some were seen about fresh water at Comondu and San Pedro.

91. *Symphemia semipalmata inornata* Brewst.

WESTERN WILLET.—Mr. Belding mentions the willet as very common in winter from near La Paz. At San Quentin Bay Mr. Anthony noted them as abundant in winter, and a few were seen throughout the summer. At Magdalena Bay I last saw them on April 27, 1888.

92. *Heteractitis incanus* (Gmel.)

WANDERING TATTLER.—On Cerros Island Mr. Belding saw them on several occasions. This is the only locality where I have found them, and in January, 1885, I obtained two specimens there.

93. *Actitis macularia* (Linn.)

SPOTTED SANDPIPER.—Occurs at the Cape region and Magdalena Bay and at Ensenada. Mr. Anthony has seen it in the fall, and Mr. Belding May 12, at San Rafael.

94. *Numenius longirostris* Wils.

LONG-BILLED CURLEW.—Given in Mr. Belding's list from the Cape region. I found them rare at Magdalena Bay and

adjoining waters. Mr. Anthony says they are very abundant along the coast in winter, and fairly swarming at San Quintin Bay. On the sand beach a few miles south of San Quintin, I shot a solitary bird, May, 1889.

95. *Numenius hudsonicus* Lath.

HUDSONIAN CURLEW.—Noted from the Cape region by Mr. Belding, and San Quintin Bay by Mr. Anthony. They were common at Magdalena Bay, often mingling with flocks of godwit and willet.

96. *Charadrius squatarola* (Linn.)

BLACK-BELLIED PLOVER.—Mr. Belding found them at the Cape region, and both he and Mr. Anthony note them from San Quintin Bay, the former having seen them as late as May 10. On Santa Margarita Island I found them in small flocks in March, 1889.

97. *Ægialitis vocifera* (Linn.)

KILLDEER.—Common in many localities of the Cape region according to Mr. Belding. Taken at Cape Saint Lucas by Mr. Xantus, October 20 to November 22. On April 21, 1888, I shot a pair at Comondu, and did not see any others that year; in 1889 they were found at every favorable watering place from Comondu to San Quintin. Mr. Anthony has found them common everywhere that he has collected. In May, 1889, he saw them on San Pedro Martir at an altitude of 9,000 feet.

98. *Ægialitis semipalmata* Bonap.

SEMIPALMATED PLOVER.—Mr. Belding notes this species as moderately common near La Paz. At San Quintin Bay Mr. Anthony found them common on both sand beaches of the ocean and mud flats of the Bay. A flock of seven was seen at Magdalena Bay, March 12, 1889, and two males secured.

99. *Ægialitis nivosa* Cass.

SNOWY PLOVER.—At the Cape region it has been noted only by Mr. Belding, and at San Quintin Bay by Messrs.

Belding and Anthony; the former found the species also at Santa Rosalia Bay. On the ocean side of Santa Margarita Island they were common March, 1889. They are birds of sand beaches rather than of mud flats.

100. *Ægialitis wilsonia* (Ord).

WILSON'S PLOVER.—Mr. Belding gives this bird as very common, in his list from the Cape region.

101. *Ægialitis montana* (Towns.)

MOUNTAIN PLOVER.—Observations upon this species from Lower California were furnished me by Mr. Anthony who met with a large flock on the open plains above San Telmo (altitude 800 ft.), in the winter of 1888-89. Mr. Belding has often met with them in winter at Tia Juana.

102. *Arenaria interpres* (Linn.)

TURNSTONE.—No turnstones have yet been reported from the Cape region. Mr. Anthony took this species in April at San Ysidro, and says it is not uncommon on all rocky beaches. I found small flocks on Magdalena Island in February and March, 1888, and Santa Margarita Island March 6, 1889.

103. *Arenaria melanocephala* (Vig.)

BLACK TURNSTONE.—Mr. Anthony saw black turnstones on San Martin Island in April. The only ones that I have found were mingled with a flock of *A. interpres* and *Charadrius squatarola* at Santa Margarita Island, March, 1889. This being probably the southermost limit from which specimens have been obtained.

104. *Hæmatopus frazari* Brewst.

FRAZAR'S OYSTER-CATCHER.—A single specimen was taken on Los Coronados Islands, May 17, 1881, by Mr. Belding, who also saw it at San Quintin Bay, Cerros Island and La Paz. Has been seen on the coast in winter and summer north of lat. 30° by Mr. Anthony.

I found this oyster-catcher tolerably common at Magdalena Bay and northward, and on Santa Margarita Island.

They were mated in January. They were rather shy, running rapidly on the beach, and if approached, taking wing with loud, clear, whistling notes, and after flying some distance, alighting again at the water's edge. Their food was chiefly small bivalves found in the gravelly beach. Two birds were obtained, of one fragments only were saved.

105. *Hæmatopus bachmani* And.

BLACK OYSTER-CATCHER.—A few were seen on Los Coronados Islands by Mr. Belding, also at San Quintin Bay and La Paz. Mr. Anthony has found them more common on the northwest coast than the preceding species.

106. *Oreortyx pictus plumiferus* (Gould).

PLUMED PARTRIDGE.—"Not at present a bird of Cape St. Lucas." (Belding). This is one of the species collected at the Cape region by Mr. Xantus. I neither heard nor saw this partridge in Lower California. Mr. Anthony has collected *Oreortyx* on San Pedro Martir which he describes as a new subspecies. Mr. Belding found them common between Campo (San Diego county) and Hansen's; a male which he shot near Campo, was identified by Mr. Ridgway as *O. p. plumiferus*. Mr. Belding says he doubts if it was ever collected in the Cape region.

107. *Oreortyx pictus confinis* Anthony.

SAN PEDRO PARTRIDGE.—Ranges from an altitude of 1,000 feet in winter to the pines on the top of San Pedro Martir, nesting from 2,500 to 9,000 feet altitude.

108. *Callipepla californica vallicola* Ridgw.

VALLEY PARTRIDGE.—According to Mr. Belding they are common at the Cape region. At Pichalique Bay he shot a young bird as early as January 25, and found it moderately common at San Quintin. Mr. Anthony has met with large flocks on San Pedro Martir at an altitude of 8,200 feet. At the times of my travels in the peninsula, the birds were mated, and hence fewer were seen. At Calmalli a nest

containing thirteen eggs was found by a miner on April 13, 1889.

109. *Callipepla gambeli* (Nuttall).

GAMBLE'S PARTRIDGE.—A few pairs with small young were seen on the western side of the peninsula, about lat. 30° N.

110. *Columba fasciata viosca* Brewst.

VIOSCA'S PIGEON.—At Cape St. Lucas and Miraflores Mr. Xantus found this pigeon in November. Mr. Belding observes that in the Victoria Mountains it was abundant; nests were found in February in oak trees. I did not meet with it at any of the localities which I visited.

111. *Zenaidura macroura* (Linn.)

MOURNING DOVE.—An abundant species at the Cape region in winter. In March, 1888, I found them common on the peninsula, but less so in April. They flocked to water in company with *Melopelia leucoptera*, morning and evening. A nest with two fresh eggs was found at Comondu April 15, 1888, built in a mesquite tree six feet from the ground. Mr. Anthony has seen this dove during spring and fall from the coast to an altitude of 8,200 feet at La Grulla, but not very common anywhere.

112. *Melopelia leucoptera* (Linn.)

WHITE-WINGED DOVE.—Mr. Belding records this species as abundant at the Cape region and in the Victoria Mountains. Mr. Anthony found them rather common at San Fernando. In 1888 they were abundant, particularly during March, in the latitude of Comondu. The first ones noticed were at the stock-ranch at Soledad, on February 3, 1888, when three were seen. Hundreds came to a water-hole on the route from San Jorge to Comondu, where I camped one night in March. After sundown the flight commenced, and continued till quite dusk; after drinking, they left to roost in the vicinity, and returned early the next morning to water before going to feeding grounds. A nest with two eggs was found at Comondu March 10, 1888; it was built upon the

small outer branches of bushes bordering the water-course. The nest was similar to that of the mourning dove.

113. *Columbigallina passerina pallescens* (Baird).

MEXICAN GROUND DOVE.—Messrs. Xantus and Belding found the ground dove abundant at the Cape region. It was not common at any place that I visited; perhaps more were seen about Comondú. The only one seen on Santa Margarita Island was taken January 26, 1888, when it came to a tank for water.

114 *Pseudogryphus californianus* (Shaw).

CALIFORNIA VULTURE.—Mr. Anthony is the only one who has reported this species from the peninsula; he has observed them at several places, from the sea level to an altitude of 11,000 feet. From the fact of their primary and secondary quills being prized by Mexican and Indian gold miners for use in carrying gold dust, an opportunity to kill a vulture is never allowed to pass unimproved.

115. *Cathartes aura* (Linn.)

TURKEY VULTURE. — Reported by all observers to be abundant. They were common on Magdalena Island, frequenting the beach where cattle and turtles were slaughtered. On Santa Margarita Island I counted twenty, early one morning, perched on the tops of the giant cacti. The offal from a turtle killed at midday attracted fourteen buzzards in less than three hours. During an exceedingly hot day I saw a number of them gathered about a water-hole at Pozo Grande. Mr. Anthony says that they range in summer from sea-level to an altitude of 11,000 feet, but are confined to the sea-coast and lower hills in winter.

116. *Elanus leucurus* (Vieill.)

WHITE-TAILED KITE.—Seen on several occasions by Mr. Anthony along the coast near Cape Colnett in late fall.

117. *Circus hudsonius* (Linn.)

MARSH HAWK.—According to Mr. Belding it is common in the Cape region, and was occasionally seen on his route

from Tia Juana to San Pedro Martir. Mr. Anthony found them abundant along the coast and in open country, nesting at Cape Colnett and San Ramon. They were not seen at an altitude greater than about 2,500 feet. In February, 1888, I saw two on Magdalena Island and an immature specimen was seen at lower Purisima cañon April 5, 1889.

118. *Accipiter velox* (Wils.)

SHARP-SHINNED HAWK.—Mr. Belding says it is rare at the Cape region. Mr. Anthony gives it as resident of the region north of San Fernando, ranging as high as 4,000 feet altitude, and adds that this species, as well as *A. cooperi*, is very destructive to quail. At San Juan, in March, 1888, I saw one in pursuit of a small bird. One was seen on Santa Margarita Island March 1, 1889.

119. *Accipiter cooperi* (Bonap.)

COOPER'S HAWK.—Mr. Xantus collected this hawk at Cape St. Lucas in October. Mr. Belding found it rare in the vicinity of La Paz. Mr. Anthony found it common as high as 4,000 feet altitude until late in the spring, and thinks he has not seen it after the last of May.

120. *Parabuteo unicinctus harrisi* (Aud.)

HARRIS'S HAWK.—Mr. Belding records it as common at the Cape region where he frequently met with it in May along the route from San José del Cabo to Miraflores. He also found it within forty miles of San Diego, and shot a specimen May 10, 1885. I first saw one at San Jorge, and again near San Juan where a pair had built in a giant cactus (*Cereus*). They were more often seen than red-tailed hawks. On April 6, 1889, I found a nest at San Gregorio built on the top of a bush (*Atamisquea emarginata*). The nest was rather flat, composed of sticks and lined with grass and "orchilla." It measured about two feet in diameter. One of the birds was sitting and flew, when, standing on my saddle, I raised my head to the height of the nest. Two eggs were secured, one of them quite fresh, the other with a

small embryo. The contents of the fresh one I ate, after frying it with a bit of tallow. It tasted somewhat like the eggs of sea-birds. One of the eggs is white, the other, pale greenish white, they measure 57x46; 57x45 millimetres.

121. *Buteo borealis calurus* (Cass.)

WESTERN RED-TAIL.—Collected at the Cape region by Mr. Belding, where he found it common. Mr. Anthony says it is common on the peninsula north of El Rosario. In January and February, 1888, I saw them sailing above Santa Margarita Island. At Ubi, May 9, 1889, I saw two birds; others were seen at San Fernando. Two specimens collected on the peninsula are rather pale in color, and each has a narrow subterminal black band on the tail, consequently cannot be referred to *B. b. lucasanus*.

122. *Buteo borealis lucasanus* Ridgw.

ST. LUCAS RED-TAIL.

123. *Buteo lineatus elegans* (Cass.)

RED-BELLIED HAWK.—Mr. Belding found a pair nesting at San Rafael. Mr. Anthony has sent me the following regarding the species: "Rather common along the coast and in the first ranges of low hills from Ensenada to El Rosario. A nest found near San Quintin, in May, contained three eggs well incubated. The nest was about 12 feet from the ground, in a sumac, rather compactly built of twigs and sticks, and lined with dry leaves. Not seen above 2,500 feet."

124. *Buteo abbreviatus* Caban.

ZONE-TAILED HAWK.—At the Cape region it has been noted only by Mr. Belding, who says it is very rare. Mr. Anthony found a pair nesting, April 24, in the top of a tall pine on San Pedro Martir, at 7,500 feet elevation.

125. *Buteo swainsoni* Bonap.

SWAINSON'S HAWK.—Mr. Anthony says it is common from the coast to 4,500 feet altitude, and nests wherever trees

furnish suitable shelter. Mr. Belding shot a specimen at Las Palmas on May 10.

126. *Aquila chrysaetos* (Linn.)

GOLDEN EAGLE.—Mr. Anthony has found this eagle rare in the San Pedro Martir region; it ranges from the coast to an altitude of 11,000 feet.

127. *Haliaetus leucocephalus* (Linn.)

BALD EAGLE.—I have seen but three individuals in Lower California: the first was an adult bird, flying above the *estero*, March 4, 1888. At the mouth of an arroyo, on the bayside of Santa Margarita Island, I found a nest in a giant cactus, March 6, 1889, which at that time I supposed contained small young. Both birds were about, one of them occasionally alighting on the edge of the nest.

128. *Falco mexicanus* Schleg.

PRAIRIE FALCON.—Mr. Xantus found this species at Miraflores, San José del Cabo and Cape St. Lucas. At San Esteban I found a pair nesting in a high cliff, April 18, 1889. Seen on two or three occasions on Guadalupe Island, in 1886, and a pair was seen about a cliff at Comondu in 1888. A single bird was noticed on Santa Margarita Island, March 2, 1889.

129. *Falco peregrinus anatum* (Bonap.)

DUCK HAWK.—Found nesting in the cliffs along the coast at several places from San Carlos landing to San Quintin by Mr. Anthony, who says they are more common in winter.

130. *Falco columbarius* Linn.

PIGEON HAWK.—A specimen was taken at La Paz in January, 1883, by Dr. H. Ten Kate.

131. *Falco sparverius* Linn.

AMERICAN SPARROW HAWK.—Recorded from the Cape region by Messrs. Xantus and Belding. Mr. Anthony found them common in summer along the base of San Pedro Martir, ranging in May to 9,000 feet altitude, and only seen on

the coast during winter. I found them on Santa Margarita Island, Magdalena Island, Guadalupe Island, and several places on the peninsula.

132. *Polyborus cheriway* (Jacq.)

AUDUBON'S CARACARA.—Mr. Belding notes this species as common at the Cape region; at Cape St. Lucas they were abundant April 1 to May 17. I found them occasionally on Santa Margarita Island and coastwise on the peninsula, but they are not often seen north of latitude 26°; two were said to have hung around a beach camp at Santo Domingo, on San Sebastian Viscaino Bay, north of lat. 28°. At Magdalena Bay settlement I saw more than elsewhere; at that place they were even more filthy in habits than the buzzards, resorting to an arroyo back of the village, where they scratched over excrement for food, getting their feet and bills smeared so that only those in good plumage were considered fit for specimens.

133. *Polyborus lutosus* Ridgw.

GUADALUPE CARACARA.—Observations on this insular species were published in Bull. Cal. Acad. Sci., vol. II, pp. 281-284. So effective has been the work of extermination carried on against this bird that Dr. Edward Palmer who first discovered them in 1875, says that he visited the island this year (1889) and did not see a single individual. He tells me that when he landed, fourteen years ago, the "*quelelis*," as they are known there, were so numerous and bold that men were obliged to stand over the angora goats with sticks to protect them from attack, particularly the kids, which were not defended by their mothers. The short-haired kind will drive off the birds, so Dr. Palmer says, from his observation. Now that man has abandoned the island I cherish the hope that a pair at least may still be living, and that some future explorer may succeed in finding the unknown eggs, and give us an account of the nesting habits of this peculiar insular species.

134. *Pandion haliaetus carolinensis* (Gmel.)

AMERICAN OSPREY.—Common at the Cape region, according to Mr. Belding. Mr. Anthony considers them abundant on all of the coast islands, and of less common occurrence along the coast. On San Martin Island he found fully-fledged young, flying by April 12, while nests one hundred feet away contained young, just hatched, or fresh eggs.

On Cerros Island fish-hawks were common, but quite shy. Nests were seen on the edge of the bluff above the beach. They were common on parts of Santa Margarita Island. They were mated when I first went to the island in January, and were seen carrying material to their nests in the giant cacti. I counted a dozen nests, January 19, 1888, upon five of which were one or two birds. I saw one of the fish-hawks chase a caracara eagle away from the neighborhood of her nest. The eagle was not struck, but closely followed by the osprey, which was trying to strike him. The osprey easily outflew the caracara.

Nests upon which the birds were seen January 19, 1888, were without eggs on February 18. Two fresh eggs were taken January 25, and a single incubated egg found in the same nest, February 18, undoubtedly the last of a set of three. The lining of the nests was invariably of coarse seaweed. At two of the nests inspected were found the weather-beaten remains of man-o'-war birds.

135. *Strix pratincola* Bonap.

AMERICAN BARN OWL.—Given by Mr. Xantus from San José del Cabo, in December and January, and at Caduana, November 25. In the night of March 15, 1889, I heard the scream of a barn owl as he flew overhead at Magdalena. They were again heard at various places along the route towards San Quintin. Mr. Anthony says they are common in the northwestern part of the territory, up to an altitude of 3,500 feet, inhabiting old mines.

136. *Asio wilsonianus* (Less.)

AMERICAN LONG-EARED OWL.—Seen occasionally by Mr. Belding between Tia Juana and San Pedro Martir.

137. *Asio accipitrinus* (Fall.)

SHORT-EARED OWL.—Obtained only by Mr. Xantus at the Cape region (Miraflores, November 25). Mr. Anthony has found them along the coast region, north of San Fernando, in winter, and has frequently flushed them in scattered companies of six to ten, from the salt grass about the bays. He has not seen them above 800 feet elevation.

138. *Syrnium occidentale* Xantus.

SPOTTED OWL.—"One seen in a deep brushy cañon in July near the base of San Pedro Martir, elevation 3,000 feet." (Anthony.)

139. *Megascops asio trichopsis* (Wagl.)

MEXICAN SCREECH OWL.—Mr. Xantus collected two young owls at Cape Saint Lucas, supposed to be this variety. Mr. Belding heard the tremulous notes of a screech owl at several places at the Cape region. My experience has been the same; they were heard at the dry camp, Cardon Grande, and at El Rancho Viejo, but no specimens taken; hence it is impossible to say to what race they belong. Mr. Anthony has seen a screech owl on several occasions between Valladares and the coast, but has not secured any specimens yet; it may be *M. a. bendirei*.

140. *Bubo virginianus subarcticus* (Hoy).

WESTERN HORNED OWL.—The specimens collected at the Cape region by Mr. Xantus were referred to *B. virginianus* by Prof. Baird. Mr. Belding found the western horned owl in the Victoria mountains of the Cape region. Mr. Anthony met with them among the pines on San Pedro Martir at 2,500 to 10,000 feet elevation. On the peninsula opposite Magdalena Island, I found in a giant cactus a bulky nest of sticks upon which could be seen two young. At Comondú, an owl of this genus was several times seen at the opening of a small cave high up in the cliff. During the night spent at the water hole at Ubi, May 9, 1889, I heard a horned owl hooting. At Calmalli, I picked up a single feather in the trail which had come from the flanks of a horned owl.

141. *Speotyto cunicularia hypogaea* (Bonap.)

BURROWING OWL.—Recorded from the Cape region only by Mr. Belding, who mentions it as rare. Mr. Anthony found a few at San Quintin, and has not seen it above 800 feet altitude. On Santa Margarita Island, I shot a female March 1, 1889. Mr. T. S. Brandegee, the botanist, saw one or two on Magdalena Island. One was seen by me on Cerritos Island in January, 1885, and the next year a pair, the only ones found, was taken on Guadalupe Island.

142. *Glaucidium hoekinsii* Brewst.

HOSKIN'S PYGMY OWL.—Type specimen from Sierra de la Laguna by Mr. Frazar. I shot a male at Comondu, March 22, 1889.

143. *Micropallas whitneyi* (Cooper).

ELF OWL.—In the Victoria Mountains Mr. Belding often heard this owl but did not succeed in obtaining any specimens, but collected four at Miraflores in April, 1882.

144. *Crotophaga sulcirostris* Swains.

GROOVE-BILLED ANI.—Mr. Belding saw four individuals at San José del Cabo and collected a nest containing eight eggs April 29, 1882. He also found it among tules at Santiago and at San Pedro on the western coast near Todos Santos.

145. *Geococcyx californianus* (Less.)

ROAD-RUNNER.—A common species at the Cape region according to Messrs. Xantus and Belding. On the northwest coast Mr. Anthony has found them from the coast to well into the pines on San Pedro Martir at an altitude of 7,000 feet. In 1888, I saw but one individual while crossing the peninsula from the Ocean to the Gulf in the latitude of Comondu. The abundance of lizards and other suitable food would seem to indicate an especially favorable region for them, but water is very scarce during most years. They were rarely seen along the route from Comondu to San Quintin. A specimen was shot the day before arriving at Calmalli.

146. *Coccyzus americanus occidentalis* Ridgw.

CALIFORNIA CUCKOO.—Mr. Anthony has observed a cuckoo at Ensenada in August, which is probably referable to this western race.

147. *Ceryle alcyon* (Linn.)

BELTED KINGFISHER.—Mr. Belding mentions it as common at the Cape region. About the bays of Ensenada and San Quintin Mr. Anthony has found them in fall and winter. I obtained specimens on Santa Margarita Island, and frequently saw the birds farther north.

148. *Dryobates villosus harrisi* (Aud.)

HARRIS'S WOODPECKER.—Seen at Hansen's by Mr. Belding, May 14, 1884. Found by Mr. Anthony on San Pedro Martir, at altitudes from 7,000 to 10,000 feet.

149. *Dryobates scalaris lucasanus* (Xantus).

ST. LUCAS WOODPECKER.—First observed by Mr. Xantus at Cape St. Lucas, where he reports it as being very abundant. Mr. Belding found it very common at the Cape region, but rarely saw any in the Victoria Mountains. I first met with this woodpecker on Santa Margarita Island, and afterwards collected specimens as far north as lat. 28.

150. *Dryobates nuttallii* (Gamb.)

NUTTALL'S WOODPECKER.—In the northern part of the territory Mr. Anthony has frequently seen it from the sea-level to 3,500 feet elevation, in localities where trees are found, and has seen them amongst the cacti of the coast hills. Mr. Belding noted it at San Rafael and Ensenada in 1887.

151. *Sphyrapicus varius nuchalis* Baird.

RED-NAPED SAPSUCKER.—Obtained at La Laguna (Cape region) by Mr. Belding, February 1, 1883.

152. *Sphyrapicus ruber* (Gmel.)

RED-BREASTED SAPSUCKER.—One or two seen in March near Ensenada, by Mr. Anthony.

153. *Melanerpes formicivorus bairdi* Ridgw.

CALIFORNIA WOODPECKER.—Observed at Hansen's by Mr. Belding, May 14, 1884. In the live oaks a few miles east of Ensenada Mr. Anthony found it not uncommon, and observed what he supposes was this woodpecker on San Pedro Martir, at an elevation of 9,500 feet.

154. *Melanerpes formicivorus angustifrons* Baird.

NARROW-FRONTED WOODPECKER. — Mr. Belding found it common at Miraflores amongst the oaks, and more abundant in the Victoria Mountains. I did not meet with it on the trip across the peninsula in 1888.

155. *Melanerpes uropygialis* (Baird).

GILA WOODPECKER.—Considered by Messrs. Xantus and Belding to be abundant at the Cape region. I found a few on Santa Margarita Island, and met with them generally along the overland route.

156. *Colaptes cafer* (Gmel.)

RED-SHAFTED FLICKER.—Mr. Belding found it at San Rafael, May 16, 1885, but it has since been noted by Mr. Anthony as far south as San Pedro Martir, where it ranged from 7,000 to 10,000 feet altitude in summer, and was evidently nesting; in winter it was found coastwise under an elevation of 3,000 feet.

157. *Colaptes chrysoides* (Malh.)

GILDED FLICKER.—A common bird at the Cape region. Mr. Anthony has not seen any north of El Rosario. I found them rare on Santa Margarita Island, and very shy; they were generally encountered along the overland route.

158. *Colaptes rufipileus* Ridgw.

GUADALUPE FLICKER.—An insular species peculiar to Guadalupe Island.

159. *Phalænoptilus nuttalli californicus* Ridgw.

CALIFORNIA POOR-WILL.—Noted at several places between Tia Juana and San Pedro Martir by Mr. Belding. Mr.

Anthony has met with it up to 8,000 feet altitude, and says it winters in the low hills near the coast. Poor-wills were heard every evening on the steep hillsides at Comondu, and at various other localities. The only specimen secured, a male, was taken at Pozo Grande, March 19, 1889. I followed the bird some time before getting a shot, and each time that it was frightened it flew about one hundred yards and alighted on cactus about three feet high. The Mexicans call them "*tapa-camino*" when they see them in the trail at dusk, but they also call the night-hawks by the same name; at Comondu they were known as "*cow-day*," from the almost perfect resemblance of their note to those words. In Upper California the birds, which I have frequently heard, utter the notes rapidly, and sounding "*poor-will*" clearly; in Lower California the sounds are given quite slowly, and resemble the words "*cow-day*" rather than "*poor-will*."

160. *Chordeiles texensis* Lawr.

TEXAN NIGHTHAWK.—Messrs. Xantus, Belding and Anthony have each noted this species from the regions which they have visited. I found it at San Juan, on the gulf side, and at San Jorge, on the west coast, and a few other localities further north.

161. *Cypseloides niger* (Gmel.)

BLACK SWIFT.—Small flocks migrating northward were seen by Mr. Anthony, during May, at San Quintin, and at San Carlos Landing (sixty miles farther south).

162. *Chaetura vauxii* (Towns.)

VAUX'S SWIFT.—Seen by Mr. Belding in May, 1885, between San Rafael and San Pedro Martir.

163. *Micropus melanoleucus* (Baird).

WHITE-THROATED SWIFT.—Seen at San José del Cabo by Mr. Belding, and at San Ysidro (April), and San Fernando (June) by Mr. Anthony. About the high cliffs forming the eastern side of San Pedro Martir, he found a colony

dashing about at an altitude of 10,000 feet; they doubtless had nests in the cliffs, but none were found. The only place on the peninsula where I saw this species was at San Borgia, but the occurrence of a large flock on Guadalupe Island has already been recorded.

164. *Trochilus alexandri* Bourc. & Muls.

BLACK-CHINNED HUMMINGBIRD. — Has been occasionally seen along the northwestern coast by Mr. Anthony.

165. *Trochilus costæ* (Bourc.)

COSTA'S HUMMINGBIRD. — Generally distributed over the peninsula and often seen in very barren regions, as reported by all observers. On Santa Margarita Island I found a nest far from water January 17, 1888; it was on an almost leafless branch, three feet high, and contained large young. Many were seen on Cerros Island in January, 1885. Mr. Belding found them tolerably common between Tia Juana and San Pedro Martir. Mr. Anthony has noticed them as high as 9,000 feet elevation.

166. *Trochilus anna* (Less)

ANNA'S HUMMINGBIRD. — Reported by Mr. Anthony as abundant about Valladares, but remaining in the vicinity of water. He saw none above 3,500 feet altitude. The capture of three individuals on Guadalupe Island was recorded by me in a previous paper. Mr. Belding and myself obtained specimens on Cerros Island, and he found them common between Tia Juana and San Pedro Martir.

167. *Trochilus rufus* Gmel.

RUFIOUS HUMMINGBIRD. — Taken at San Quintin during migration by Mr. Anthony, who is not sure that *T. alleni* also occurs, as none were collected.

168. *Basilinna xantusi* (Lawr.)

XANTUS'S HUMMINGBIRD. — At the Cape region Mr. Belding found it only in mountain cañons during the winter, but in

summer they scatter to orchards and gardens, where they nest. I have found them only in mountainous country, where there was abundance of water, from Comondu as far north as lat. 29°. None were seen on the islands.

169. *Tyrannus verticalis* Say.

ARKANSAS KINGBIRD.—One pair seen at San Quintin Bay May, 1881, by Mr. Belding.

170. *Tyrannus vociferans* Swains.

CASSIN'S KINGBIRD.—Recorded from the Cape region and Cerros Island by Mr. Belding. Mr. Anthony found it nesting in live oaks and cottonwoods up to about 4,000 feet altitude, and thinks he has seen none after the middle of November. I secured a specimen near Pozo Grande, and occasionally saw them farther north.

171. *Myiarchus cinerascens* Lawr.

ASH-THROATED FLYCATCHER. — One of the most generally distributed species found in Lower California. Mr. Anthony says that along the northwestern coast he has found them nesting in the dry flower-stalks of *Agave*.

172. *Sayornis saya* (Bonap.)

SAY'S PHŒBE.—From the Cape region and vicinity of San Rafael, Mr. Belding says it is rare; he and myself found them on Cerros Island. On Magdalena Island, February 23, 1889, I shot a very pale-plumaged male; the previous year I saw them at several places on the peninsula. Mr. Anthony has found the nests of this species in old mines and tunnels at Valladares, frequently at a depth of twenty feet in a shaft. Mr. Belding saw it at Tia Juana and San Rafael in the middle of May, 1885, in a mining shaft at the latter place.

173. *Sayornis nigricans* (Swains.)

BLACK PHŒBE. — One specimen was collected by Mr. Xantus at Cape St. Lucas, and Mr. Belding found it rare at the Cape region and between Tia Juana and San Pedro

Martir. They were tolerably common at Comondu, and were found in favorable localities as far as San Fernando, where a pair were re-lining a nest May 19, 1889, from which the young had flown. At Comondu eggs were found March 13, and full-fledged young April 9, 1888.

174. *Contopus borealis* (Swains.)

OLIVE-SIDED FLYCATCHER.—Reported by Mr. Belding as a migrant at Hansen's, May 14, 1884, and at Tia Juana the same month. Mr. Anthony found them only on San Pedro Martir, from 7,000 to 11,000 feet elevation, and says they were evidently nesting.

175. *Contopus richardsonii* (Swains.)

WESTERN WOOD PEWEE.—Mr. Belding noted it from several localities between Tia Juana and San Pedro Martir. Mr. Anthony has seen a few individuals on San Pedro Martir below 7,000 feet. I collected a specimen at San Sebastian, April 29, 1889.

176. *Empidonax difficilis* Baird.

WESTERN FLYCATCHER.—Mr. Belding found this species (possibly *E. cineritius*) rare at the Cape region, and secured one specimen at Cerros Island. At Valladares Mr. Anthony has noticed it during fall migration. Mr. Belding found it tolerably common in wooded cañons north of San Pedro Martir in May, 1885.

177. *Empidonax cineritius* Brewst.

ST. LUCAS FLYCATCHER.—Mr. Frazar collected specimens at La Laguna. I shot it at Comondu in April, 1888, and Mr. Ridgway has identified it as *E. cineritius*. Seven other specimens were obtained from Santa Margarita Island, Comondu and San Benito. Mr. Anthony gives it from San Pedro Martir up to 10,000 feet altitude.

178. *Empidonax pusillus* (Swains.)

LITTLE FLYCATCHER.—Mr. Belding has found it at Tia Juana in April and May, and at other places north of San Pedro Martir.

179. *Empidonax hammondi* (Xantus).

HAMMOND'S FLYCATCHER.—According to Mr. Belding, who found it at Tia Juana in April, it is a rare migrant.

180. *Empidonax obscurus* (Swains.)

WRIGHT'S FLYCATCHER.—Messrs. Xantus and Belding record it as common in winter at the Cape region; the latter says it is more rare in summer. At Tia Juana he found it in April and May.

181. *Empidonax griseus* Brewst.

GRAY FLYCATCHER.—Obtained at La Paz, Triunfo and San José del Cabo by Mr. Frazar. On Santa Margarita Island I collected it in February, 1888, and in March I shot one at Comondu which is identical except for a narrower bill.

182. *Pyrocephalus rubineus mexicanus* (Sol.)

VERMILION FLYCATCHER.—Mr. Belding secured a single specimen at the Cape region, and says they are moderately common there. I met with it only in the latitude of Comondu, usually in cultivated gardens.

183. *Otocoris alpestris chrysolæma* (Wagl.)

MEXICAN HORNED LARK.—A small flock seen at Santa Rosalia Bay by Mr. Belding was referred to this form, but a specimen of his collecting has since been made the type of *O. a. rubea*. I obtained a small series at Magdalena Island, and met with it on Santa Margarita Island and the peninsula northward.

184. *Otocoris alpestris rubea* Hensh.

RUDDY HORNED LARK.—At San Rafael, Mr. Belding found it common, also at a few other localities. He does not consider the San Rafael or even San Diego *Otocoris* a good example of *O. a. rubea*. In the northwestern region it is found breeding, according to Mr. Anthony, from sea level to an altitude of 11,000 feet. I secured a male May 22, 1889, a few miles south of San Quintin.

185. *Cyanocitta stelleri frontalis* Ridgw.

BLUE-FRONTED JAY.—Found only by Mr. Belding in the northern part of the peninsula at Valle Palmas, Vallecitas and Guadalupe cañon in May, 1885. It was not found in the pine region about Hansen's.

186. *Aphelocoma californica* (Vig.)

CALIFORNIA JAY.—Common about Euseñada and to the eastward, according to Mr. Anthony.

187. *Aphelocoma californica hypoleuca* Ridgw.

XANTUS'S JAY.—The jays found by Messrs. Xantus and Belding at the Cape region, and recorded as *californica*, would now be regarded as belonging to this race. I saw a few among the mangroves of Magdalena Island, and along the mangrove-bordered *estero* to San Jorge, and northward as far as lat. 28°.

188. *Aphelocoma californica obscura* Anthony.

BELDING'S JAY.—Known only from San Pedro Martir, where Mr. Anthony collected his type specimens.

189. *Corvus corax sinuatus* (Wagl.)

AMERICAN RAVEN.—Mr. Belding found it common at the Cape region, from where they extend through the entire peninsula and shore islands. At Comondu, Mr. T. S. Brandegee found a nest containing unfledged young in a cliff, March 21, 1889. The Mexicans said they carried away young chickens from close to the houses.

190. *Corvus americanus* Aud.

AMERICAN CROW.—“Common in some localities near the boundary, in winter and late spring.” (Belding in litt.)

191. *Picicorvus columbianus* (Wils.)

CLARKE'S NUTCRACKER.—Mr. Anthony has noted the occurrence of two individuals at La Grulla.

192. *Cyanocephalus cyanocephalus* (Wied.)

PINON JAY.—In the piñons between Campo and Hansen's Mr. Belding found them abundant, May, 1884. Mr.

Anthony found it abundant on San Pedro Martir, at 7,000 to 11,000 feet altitude.

193. *Molothrus ater obscurus* (Gmel.)

DWARF COWBIRD.—Mr. Belding found it common in the streets of San José del Cabo, associated with Brewer's blackbird, April 1 to May 17, but was rarely seen during the latter month. Mr. Anthony several times saw what he supposes was this cowbird at San Quintin.

194. *Xanthocephalus xanthocephalus* (Bonap.)

YELLOW-HEADED BLACKBIRD.—Mr. Anthony informs me that it is very common along the coast during migrations. At San José del Cabo it has been noted by Mr. Belding.

195. *Agelaius phoeniceus* (Linn.)

RED-WINGED BLACKBIRD.—Mr. Belding notes it as rare at San José del Cabo. Mr. Anthony has observed them along the northwest coast.

196. *Agelaius gubernator* (Wagl.)

BICOLORED BLACKBIRD.—First met with at El Rosario where they were nesting in a fresh water swamp.

197. *Agelaius tricolor* (Nutt.)

TRICOLORED BLACKBIRD.—“Rather common along the northwest coast, breeding in all fresh water marshes.” (Anthony.) At San Rafael Valley Mr. Belding found a large colony nesting in tules, May, 1885.

198. *Sturnella magna neglecta* (Aud.)

WESTERN MEADOWLARK.—In the vicinity of La Paz and San José del Cabo, Mr. Belding reports it as rare. He also saw one or two on Cerros Island, and a few near San Rafael. The single bird which I failed to collect on Guadalupe Island has been recorded. Upon a narrow strip of sand-hills between the *estero* and the ocean, about seventy miles from Magdalena Island, I heard larks singing; and with the exception of one taken near Pozo Grande, they

were not found elsewhere until within a few days' travel of San Quintin.

199. *Icterus parisorum* Bonap.

SCOTT'S ORIOLE.—Found by Messrs. Xantus and Belding at the Cape region. By Mr. Anthony it is said to prefer the low hills near the coast south of San Quintin, where it nests in the thorny branches of the candlewood (*Fouquieria columnaris*). Mr. Belding has seen it near the boundary line south of Tia Juana and between San Rafael and San Pedro Martir, in elevated juniper-covered *mesas*. I first heard the song of this oriole one day's travel south of San Borgia, and my guide said it was a meadowlark—the notes at a distance did resemble an imperfect song of a lark. At Ubi I first saw the birds, and usually far from water; they seemed to prefer open plains covered with thorny vegetation and cacti to the cultivated tracts in the vicinity of ranches.

200. *Icterus cucullatus nelsoni* Ridgw.

ARIZONA HOODED ORIOLE.—Generally distributed over the peninsula, particularly in the vicinity of water and habitations. I found them on Santa Margarita Island in January. At Comondu they were nesting in the palm trees. A young one, caged at San Fernando, was fed by the male parent.

201. *Icterus bullocki* (Swains.)

BULLOCK'S ORIOLE. — Observed by Mr. Anthony during migration. Mr. Belding has found them tolerably common from San Rafael northward.

202. *Scolecophagus carolinus* (Mü l.)

RUSTY BLACKBIRD.—The capture of a single specimen at Valladares is recorded by Mr. Anthony in the present volume, p. 86.

203. *Scolecophagus cyanocephalus* (Wagl.)

BREWER'S BLACKBIRD.—Observed by Mr. Belding at San José del Cabo. In March, 1888, I saw two flocks at San

Julio plain east of Comondu, and did not meet with any again until arriving at San Ignacio in the middle of April, 1889, when they were seen in small flocks about the streets and gardens. Mr. Anthony has found them at times in small flocks on San Pedro Martir.

204. *Carpodacus mexicanus frontalis* (Say).

HOUSE FINCH.—The specimens taken by Mr. Xantus and referred to this form, and those collected later by Mr. Belding, and considered by Mr. Ridgway to be remarkably fine examples of "*rhodocolpus*," are now placed under the subspecies *C. mexicanus ruberrimus*. Mr. Anthony has found *C. m. frontalis* common everywhere in the northwest. I met with them first at lat. 28°, and also on Cerros Island, at which place Mr. Belding saw three examples.

205. *Carpodacus mexicanus ruberrimus* (Ridgw.)

ST. LUCAS HOUSE FINCH.—The observations on house finches from the Cape region are given under the preceding variety. The description of the nest and eggs appears in this volume on page 23. Measurements and remarks on the constancy and extent of the pink tinge are here appended.

CARPODACUS FRONTALIS RUBERRIMUS, FROM LOWER CALIFORNIA.

Collector's number.	Sex	Date, 1888.	Locality.	Wing.....	Tail feathers...	Tarsus.....	Bill from nos- tril	Depth of bill at base.....	Breadth of upper mandible.
				mm.	mm.	mm.	mm.	mm.	mm.
2924	♂	January 17	S. M. Is..	73.	58.	16.	8.5	8.	7.5
2934	♂	" 18	" "	73.	57.	16.5	8.5	7.5	7.
3043	♂	March 12..	Comondu	74.	58.	16.	8.5	8.	7.5
3149	♂	April 9....	"	74.	56.5	17.	8.	8.	7.5
3150	♂	" ".....	"	72.5	57.5	16.	6.5	8.5	8.
3177	♂	" 12....	"	72.	58.	15.	8.5	8.	7.
3178	♂	" ".....	"	75.	60.	17.	8.	7.5	7.
3190	♂	" 14....	"	73.	57.	16.	8.5	8.	7.
3191	♂	" ".....	"	74.	57.5	15.	8.5	7.5	7.
3203	♂	" 15....	"	75.	60.	15.5	8.	8.	7.
Average.				73.5	57.9	16.	8.3	7.9	7.2
3180	♀	April 12...	Comondu	71.	53.	16.	8.5	8.	7.5
3192	♀	" 14....	"	70.	54.	16.	8.5	8.	7.

No. 2924.—Decidedly pink crissum; no pink on wing bands.

No. 2934.—No pink on crissum or wing bands.

No. 3043.—Slightly pink on crissum and wing bands.

No. 3149.—Crissum pink; wing bands slightly tinged.

No. 3150.—Crissum pink.

No. 3177.—Faintest trace of pink on crissum and wing bands.

No. 3178.—Trace of pink on crissum and wing bands.

No. 3190.—No trace of pink on crissum or wing bands; a pinkish tinge at vent.

No. 3191.—No trace of pink on crissum or wing bands.

No. 3203.—Wing bands and crissum pink.

No. 3180.—Ovaries large.

206. *Carpodacus amplus* Ridgw.

GUADALUPE HOUSE FINCH.—The life history of this insular species was given in the "Additions to the Ornithology of Guadalupe Island."

207. *Loxia curvirostra stricklandi* Ridgw.

MEXICAN CROSSBILL.—Not reported from anywhere on the peninsula. On Guadalupe Island I found it to be a resident species, restricted in number and confined to the pine belt at the north end of the island.

208. *Spinus tristis* (Linn.)

AMERICAN GOLDFINCH.—Mr. Belding has seen a few in winter in Tia Juana valley.

209. *Spinus psaltria* (Say).

ARKANSAS GOLDFINCH.—Mr. Belding found it common at the Cape region. During migration Mr. Anthony has noticed it at about lat. 31° N., from the sea-level to 3,500 feet elevation. I collected it on Santa Margarita Island in January, 1889, and in April the same year found nests at Comondu.

210. *Spinus lawrencei* (Cass.)

LAWRENCE'S GOLDFINCH.—Observed by Messrs. Belding and Anthony in the northwest. In the Tia Juana valley the former says it is abundant.

211. *Spinus pinus* (Wils.)

PINE SISKIN.—A single bird was shot by Mr. Belding from a flock of *S. psaltria* at the Cape region. On one or two occasions in May, Mr. Anthony has seen it on San Pedro Martir.

212. *Poocætes gramineus confinis* Baird.

WESTERN VESPER SPARROW.—Several were shot near La Paz by Mr. Belding in the winter. I found them near Pozo Grande and obtained one specimen at Llanos de San Julian. Mr. Anthony has noted it as not uncommon on the northwest coast.

213. *Ammodramus sandwichensis alaudinus* (Bonap.)

WESTERN SAVANNA SPARROW.—Recorded from Cape St. Lucas in September by Mr. Xantus. Mr. Belding has

found it at various localities of the Cape region. I found a few at San Jorge in April.

214. *Ammodramus beldingi* Ridgw.

BELDING'S MARSH SPARROW.—The Marsh sparrow given in Mr. Belding's list of San Quintin Bay species as *Passerculus anthinus* (Bp.) is now known to be *Ammodramus beldingi* which Mr. Anthony says is resident there. Mr. Belding reports it from as far north as Port Harford (Alta California) where it was rare. I obtained two immature birds on the salt marsh south of San Quintin the last day of the overland journey.

215. *Ammodramus rostratus* Cass.

LARGE-BILLED SPARROW.—Found at San José del Cabo by Mr. Xantus. Obtained at La Paz, Cape St. Lucas and other localities by Mr. Belding. I found, among the bushes on the sand hills near Magdalena village, a few of these sparrows in February, 1888, and did not see them elsewhere.

216. *Ammodramus rostratus guttatus* Lawr.

ST. LUCAS SPARROW.—First obtained at San José del Cabo by Mr. Xantus in December, 1859. I secured a single male on Santa Margarita Island, January 21, 1888, which Mr. Ridgway says is most like the type specimen of any he has seen. The bird is in good plumage and has conspicuous yellow-stripes from nostrils extending back over the eyes, brighter anteriorly.

The type specimen measures: wing, 2.55 (64.7 mm.); tail, 1.95 (49.5 mm.); tarsus, .82 (20.8 mm.); middle toe, .62 (15.7 mm.); culmen, .45 (11.4 mm.); bill from nostril, .32 (8.1 mm.); depth of bill at base, .22 (5.6 mm.)

My specimen (No. 2,940, coll. of W. E. B.), measures: wing, 68 mm.; tail, 52 mm.; tarsus, 22 mm.; middle toe, 15.5 mm.; culmen, 11.5 mm.; bill from nostril, 9 mm.; depth of bill at base, 6 mm.

217. *Ammodramus savannarum perpallidus* Ridgw.

WESTERN GRASSHOPPER SPARROW.—Rare, but seen at several localities at the Cape region by Mr. Belding.

218. *Chondestes grammacus strigatus* (Swains.)

WESTERN LARK SPARROW.—Found by Messrs. Xantus and Belding at the Cape region. Mr. Anthony has seen a few in spring at San Quintin. I found them generally distributed over the peninsula in winter and spring.

219. *Zonotrichia leucophrys* (Forst.)

WHITE-CROWNED SPARROW.—Collected at the Cape region by Messrs. Xantus and Belding, the latter has taken it on Cerros Island and at San Diego in May. I found it on Santa Margarita Island and various places on the peninsula.

220. *Zonotrichia intermedia* Ridgw.

INTERMEDIATE SPARROW.—Mr. Xantus secured specimens at Cape St. Lucas. Mr. Anthony includes it in the list of 195 species which he has sent me of the birds from the northwest.

221. *Zonotrichia gambeli* (Nutt.)

GAMBEL'S SPARROW.—Not reported from the Cape region. Mr. Anthony notes it as abundant during winter and spring in the latitude of 41° N. Mr. Belding and myself have seen it common about Ensenada. I collected immature specimens on Santa Margarita Island.

222. *Zonotrichia coronata* (Pall.)

GOLDEN-CROWNED SPARROW.—Three immature specimens were collected by me on Guadalupe Island in 1886.

223. *Spizella socialis arizonæ* Coes.

WESTERN CHIPPING SPARROW.—Mr. Belding found it rather rare in the Victoria Mountains, and none were seen below 3,000 feet altitude. Mr. Anthony has met with it at lat. 31° N., from the coast to 2,500 feet altitude. I obtained a single specimen, the only one seen, on Guadalupe Island January 6, 1886.

224. *Spizella pallida* (Swains.)

CLAY-COLORED SPARROW.—Mr. Belding found this species common at the Cape region. It was common on Santa Margarita Island and northward on the peninsula.

225. *Spizella breweri* Cass.

BREWER'S SPARROW.—Abundant at the Cape region according to Mr. Belding. I obtained one specimen at San Julio (near Comondú) that is intermediate between this species and *S. pallida*.

226. *Spizella atrigularis* (Cab.)

BLACK-CHINNED SPARROW.—Has been taken at the Cape region by Mr. Belding who several times saw it in May, 1885, between San Rafael and San Pedro Martir, but nowhere numerous. Mr. Anthony met with a few on San Pedro Martir at 10,000 feet elevation. At Valladares he says they were common and nesting.

227. *Junco hyemalis oregonus* (Townsend.)

OREGON JUNCO.—In May, 1884, Mr. Belding met with them in the pine regions about Hansen's. In winter and spring Mr. Anthony has found them at lat. 31° N., from 1,000 to 3,000 feet altitude. I collected a single specimen, the only one seen, on Guadalupe Island February 16, 1886.

228. *Junco bairdi* Belding.

BAIRD'S JUNCO.—A common species in the Victoria mountains above an altitude of 3,000 feet. The type specimens were collected by Mr. Belding at La Laguna.

229. *Junco insularis* Ridgw.

GUADALUPE JUNCO.—Known only from Guadalupe Island where Dr. Palmer obtained the first specimens. For description of habits and nesting, see Bull. Cal. Acad. Sci., Vol. II, 300-302.

230. *Junco townsendi* Anthony.

TOWNSEND'S JUNCO.—This recently added species was found by Mr. Anthony on San Pedro Martir in winter as

high as 2,500 feet altitude, mixed with flocks of *J. h. oregonus*, and in summer abundant in the pine belt from 7,000 to 11,000 feet altitude. It nests during the first week in May. (See these Proceedings, p. 76.)

231. *Amphispiza bilineata* (Cass.)

BLACK-THROATED SPARROW.—Reported as common at the Cape region by Mr. Belding who did not see any at San Quintin Bay but found them moderately common at Santa Rosalia Bay and San Rafael Valley. Mr. Anthony found them not uncommon in the low hills a few miles from the coast about lat. 31° N. On Santa Margarita and Magdalena Islands they were the most common and generally distributed species. Breeding far from any water, nests were found in bushes from one to five feet above the ground. On the peninsula and Cerros Islands I found them equally common.

232. *Amphispiza belli* (Cass.)

BELL'S SPARROW.—Mr. Anthony mentions it as common from sea-level to 1,500 feet elevation. I secured a single specimen south of San Quintin, May, 1889. Mr. Belding found it common at Santa Rosalia Bay.

233. *Peuceea ruficeps boucardi* (Sol.)

BOUCARD'S SPARROW.—In the Victoria Mountains Mr. Belding found them common on grassy hillsides above 2,500 feet altitude. By February they were usually seen in pairs. I obtained a single specimen at Llanos de San Julian April 19, 1889.

234. *Melospiza fasciata samuelis* (Baird).

SAMUEL'S SONG SPARROW.—One individual seen amongst some tules at San Quintin by Mr. Belding. I found them quite common in the large fresh water swamp at El Rosario, and song sparrows that I supposed were of this form, were seen at San Fernando.

235. *Melospiza fasciata rivularis* Bryant.

BROWN'S SONG SPARROW.—Not known from farther south than Comondu, and was not found north of San Ignacio. At all favorable intermediate localities it was seen, and in such places was breeding. It was found near the western coast at lower Purisima cañon. Mr. Anthony says it is "common in the pines of the San Pedro range at 7,500 to 10,000 feet, also seen along the coast at San Ramon and San Ysidro," but without specimens; I surmise that the sparrows mentioned are the same as I found at El Rosario. The specimens which I collected at San Ignacio are remarkably true to the types, and the Lower California bird may yet rank as a quite distinct local species, the intergradation suggested by comparison with specimens of *M. f. fallax* from Arizona failing to appear in the additional material from the peninsula.

For farther notes and tables of measurements, see these Proceedings, Vol. I, pp. 197-200. Vol. II, pp. 22-23.

236. *Melospiza lincolni* (Aud.)

LINCOLN'S SPARROW.—Found in the Cape region by Mr. Belding, and observed by Mr. Anthony on the northwest coast during migration. I obtained two specimens on Guadalupe Island in 1886, and found them at Comondu and Jesus Maria.

237. *Passerella iliaca unalaschensis* (Gmel.)

TOWNSEND'S SPARROW.—The only claim of this variety to a place in the list of Lower California birds rests upon a single specimen which I shot on Guadalupe Island February 16, 1886. Mr. Anthony, however, has seen individuals of this genus in lat. 31° N. which may belong to this variety.

238. *Pipilo maculatus megalonyx* (Baird).

SPURRED TOWHEE.—Found at San José del Cabo in April and May by Mr. Belding. In the region of San Pedro Martir, Mr. Anthony says it breeds from 2,500 to 11,000 feet altitude.

239. *Pipilo consobrinus* Ridgw.

GUADALUPE TOWHEE.—Nothing new has been learned regarding this insular species since my visit to the island in 1885-86. (See Bull. Cal. Acad. Sci., Vol. II, No. 6, pp. 303-305.)

240. *Pipilo chlorurus* (Towns.)

GREEN-TAILED TOWHEE.—Reported common at the Cape region by Mr. Belding. I obtained specimens on Santa Margarita Island and at various places on the peninsula.

241. *Pipilo fuscus albigula* (Baird).

ST. LUCAS TOWHEE.—First obtained at Cape St. Lucas by Mr. Xantus, and later by Mr. Belding. I found them as far north as lat. 30°.

242. *Pipilo fuscus crissalis* (Vig.)

CALIFORNIAN TOWHEE.—In the vicinity of latitude 31° N., Mr. Anthony found it from sea level to 5,000 feet altitude.

243. *Cardinalis cardinalis igneus* (Baird).

ST. LUCAS CARDINAL.—Messrs. Xantus and Belding collected this variety at the Cape region. On Santa Margarita Island I occasionally saw them among thick high shrubs and trees. At Comondu they were common and were met with nearly to lat. 29° N.

244. *Pyrhuloxia sinuata peninsulæ* Ridgw.

ST. LUCAS PYRRHULOXIA.—Obtained by Messrs. Xantus and Belding, and mentioned in their lists as *P. sinuata*. I did not see any during my wanderings on the islands or the peninsula.

245. *Habia melanocephala* (Swains.)

BLACK-HEADED GROSBEAK.—Noted from the Cape region by Messrs. Xantus and Belding. It is not common in the northwest, according to Messrs. Belding and Anthony. The former found it breeding at Valle Trinidad, and saw a single specimen on Cerros Island, and the latter at San Rafael. I obtained a single pair at Comondu April 22, 1888.

246. *Guiraca caerulea eurhyncha* Coues.

WESTERN BLUE GROSBEAK.—Has been found by Mr. Belding at San José del Cabo and San Quintin, between San Diego and San Pedro Martir; he often saw them in poplar and willow thickets. I met with them only at Comondu; those which were taken had been feeding in a patch of growing wheat.

247. *Passerina amœna* (Say).

LAZULI BUNTING.—From the Cape region it has been recorded only by Mr. Belding. I found it rare at Comondu and northward. Messrs. Belding and Anthony have met with it in the northwest.

248. *Passerina versicolor pulchra* Ridgw.

BEAUTIFUL BUNTING.—First obtained at Cape St. Lucas by Mr. Xantus and later at Miraflores by Mr. Belding, by whom the type of this variety was collected.

249. *Calamospiza melanocorys* Stejn.

LARK BUNTING.—Reported from the Cape region by Messrs. Xantus and Belding. Mr. Anthony has noted it along the coast, but not extending into the hills. Mr. Belding, however, has met with flocks from the boundary line to San Pedro Martir. On Santa Margarita Island, March 1, 1889, I secured specimens from a flock numbering nearly twenty, and afterward found them on the peninsula at many places during the overland trip. Their song is quite musical, especially when many are congregated in the bushes and singing at the same time.

250. *Piranga ludoviciana* (Wils.)

LOUISIANA TANAGER.—At Cape St. Lucas obtained only by Mr. Xantus September 27 to November 17. Mr. Belding met with it in the Victoria mountains, and also at La Paz. Mr. Anthony tells me it is found from the coast to 3,000 feet altitude, but is not common. In April, 1888, I shot two moulting birds at Comondu.

251. *Progne subis hesperia* Brewst.

WESTERN MARTIN.—Taken at Cape St. Lucas by Mr. Xantus, and seen by Mr. Belding at San José del Cabo, April 29, 1882. Collected at Sierra de la Laguna by Mr. Frazar. Several colonies were found by Mr. Anthony nesting on San Pedro Martir, at altitudes ranging from 7,500 to 8,000 feet. A few were seen migrating in April along the coast. Mr. Belding found them nesting in dead pines at Hansen's. A single pair was seen by me at San Fernando May 18, 1889.

252. *Petrochelidon lunifrons* (Say).

CLIFF SWALLOW.—At San José del Cabo was first seen by Mr. Belding April 29, 1882. At San Quintin Bay he noticed them in May, 1881. Nests were found by Mr. Anthony in cliffs near the coast at San Ysidro in April and May. On San Pedro Martir he found a small nesting colony at an altitude of 8,200 feet.

253. *Chelidon erythrogaster* (Bodd.)

BARN SWALLOW.—Mr. Belding noticed it at San Quintin Bay in May, 1881, but has not seen any south of there. A few birds were seen at San Jorge in March, 1888.

254. *Tachycineta bicolor* (Vieill.)

TREE SWALLOW.—At the Cape region was often seen in winter by Mr. Belding. Other observers do not mention it.

255. *Tachycineta thalassina* (Swains.)

VIOLET-GREEN SWALLOW.—Noted by Messrs. Xantus and Belding at the Cape region. Mr. Anthony says it is common in the pines on San Pedro Martir, nesting at Valladares (2,500 feet) and higher. Near Comondu I found it nesting in the holes made by the Gila woodpecker in giant cacti. A full-fledged young was taken in April, 1888, near Comondu.

256. *Ampelis cedrorum* (Vieill.)

CEDAR WAXWING.—According to Mr. Belding, it is very rare at the Cape region, where it feeds upon mistletoe ber-

ries. I saw one small flock at Comondu on April 7, 1888, and secured five specimens. One bird was taken on Guadalupe Island.

257. *Phainopepla nitens* (Swains.)

PHAINOPEPLA.—Found at Cape St. Lucas by Mr. Xantus. According to Mr. Belding, it is very common at the Cape region, except in the high mountains. Mr. Anthony has met them from Ensenada southward, up to an altitude of 6,000 feet; their presence, he says, is governed by the food supply, which is obtained usually in mesquite thickets. They were common near La Giganta (San Pedro and San Julio plains), also met with at and near Comondu. A nest containing three large young was found near Pozo Grande, April 21, 1888; it was built in a mesquite six feet from the ground, and in a very exposed situation. The young were fed with mistletoe berries.

258. *Lanius ludovicianus gambeli* Ridgw.

CALIFORNIA SHRIKE.—Said by Mr. Belding to be common at the Cape region. Mr. Anthony has met with it along the entire northwestern coast region. I found on Cerros, Guadalupe, and Santa Margarita Islands, and in several places on the peninsula, birds which have been referred to this race. Some Mexican children at Juncal had six young in a cage, supposing they were mockingbirds.

259. *Vireo gilvus swainsoni* (Vieill.)

WESTERN WARBLING VIREO.—At Miraflores Mr. Belding found it moderately common, May 9, 1882. I took a single high-plumaged male at Comondu, April 12, 1888.

260. *Vireo solitarius cassinii* (Xantus).

CASSIN'S VIREO.—Found breeding at San José del Cabo by Mr. Belding, and common at Miraflores.

261. *Vireo huttoni stephensi* Brewst.

STEPHEN'S VIREO.—In the Victoria Mountains Mr. Belding met with it only above 3,000 feet altitude.

262. *Vireo bellii pusillus* (Cooper).

LEAST VIREO.—Rare at the Cape region according to Mr. Belding. Mr. Anthony found it common in willow thickets on the northwest coast up to 3,000 feet altitude. Nesting from 500 to 2,500 feet altitude. I obtained specimens on Santa Margarita Island in winter, and found them in May at San Fernando; at Comondu in March; at San Benito in April, and at El Rosario, May 21, 1889.

263. *Vireo vicinior* Cooper.

GRAY VIREO.—Not many were seen in any part of Lower California by Mr. Belding, who noted them from south of Campo, at an altitude of 3,000 feet in May, 1884; near San Rafael in May, 1885, and the mountains east of Ensenada in April, 1887.

264. *Helminthophila ruficapilla gutturalis* Ridgw.

CALAVERAS WARBLER.—Mr. Belding reports the bird as a rare migrant. He has seen it only in spring at Tia Juana, a town on the boundary line.

265. *Helminthophila celata* (Say).

ORANGE-CROWNED WARBLER.—A single specimen was collected by Mr. Belding at the Cape region in January, 1882.

266. *Helminthophila celata lutescens* Ridgw.

LUTESCENT WARBLER.—Common at the Cape region according to Mr. Belding, who has occasionally seen it between the boundary line and San Pedro Martir. Other observers do not mention having seen it in Lower California. On Santa Margarita Island I found it common in January, 1888, and at Comondu in March. In San Benito cañon I shot a male April 10, 1889, and took a female at El Rosario May 21, 1889. One of the Santa Margarita Island birds which Mr. Ridgway has examined is quite different from the others of the series and may, he remarks, belong to a local race. My visit to the island this year was made too late to find many of the small land species obtained the previous year, and no additional specimens were taken.

267. *Dendroica aestiva* (Gmel.)

YELLOW WARBLER.—At the Cape region it was found to be rare by Mr. Belding. In spring Mr. Anthony says it is common on the northwest coast up to 2,500 feet altitude.

268. *Dendroica bryanti castaneiceps* Ridgw.

MANGROVE WARBLER.—"Common in the shrubbery around the Bay of La Paz; also seen at Pichalique Bay and Espiritu Santo Island. It frequented almost exclusively the mangroves (*Rhizophora mangle*), and is probably resident." (Belding). I heard their song in the mangroves bordering the long *estero* northward from Magdalena Bay, and in the mangroves on Santa Margarita Island where I saw a male March 2. 1889.

269. *Dendroica auduboni* (Towns.)

AUDUBON'S WARBLER.—In the Victoria mountains and the Cape region Mr. Belding found it common, but rare at Hansen's, May 14. On San Pedro Martir Mr. Anthony met with it at 9,000 feet elevation May 10. In the winter of 1885-6, I collected two males on Guadalupe Island. They were also found on Santa Margarita Island, and in March at Comondú.

270. *Dendroica nigrescens* (Towns.)

BLACK-THROATED GRAY WARBLER.—In the Victoria mountains Mr. Belding found it very common above 3,000 feet altitude and occasionally saw it in cañons of about 1,000 feet altitude. At Hansen's it was rather rare May 14. Specimens were shot at Tia Juana May 2. Mr. Anthony has found it only in the region of San Pedro Martir where it breeds from 7,500 to 11,000 feet altitude.

271. *Dendroica townsendi* (Nutt.)

TOWNSEND'S WARBLER.—A male was seen April 14, 1882, at Miraflores by Mr. Belding; and at Tia Juana he shot specimens May 2. Mr. Anthony has taken a single bird in spring at San Quintín.

272. *Dendroica occidentalis* (Towns.)

HERMIT WARBLER.—Mr. Belding mentions it as a rare migrant, having observed three at Tia Juana May 2. A single bird noted at San Quintin in the fall by Mr. Anthony are the only records.

273. *Seiurus noveboracensis notabilis* (Grinn.)

GRINNELL'S WATER THRUSH.—Two specimens (females) were obtained at La Paz by Mr. Belding, and one at Todos Santos.

274. *Geothlypis macgillivrayi* (Aud.)

MACGILLIVRAY'S WARBLER.—Mr. Belding met with this species in mountain cañons of the Cape region where it was rare. At Tia Juana he says it occurs as a migrant. In March, 1888, I shot a female at Comondu and did not again see any.

275. *Geothlypis trichas occidentalis* Brewst.

WESTERN YELLOW-THROAT.—Common at the Cape region according to Mr. Belding. In swamps along the northwest coast Mr. Anthony found it common, and saw none above 1,000 feet elevation. I shot one on Santa Margarita Island, the only place where it was met with.

276. *Geothlypis beldingi* Ridgw.

BELDING'S YELLOW-THROAT.—“Common in the few suitable localities around San José, Miraflores and cañons of the Miraflores and Santiago Peaks. At Agua Caliente a pair was noticed feeding their young just out of the nest, May 7. The only note traced to these species was a loud *chip*. I listened long, when in the neighborhood of one or more of these birds, for the familiar song of the Maryland yellow-throat (*G. trichas*), but failed to hear it.” (Belding, Proc. U. S. Nat. Mus., Vol. V., p. 546). In March, 1888, I first met with this species at Comondu, and in April, 1889, I found them apparently as common and obtained eleven eggs from four of the five nests discovered. [See Descriptions of the Nests and Eggs of some Lower California Birds, with a

Description of the Young Plumage of *Geothlypis beldingi*, in in these Proceedings, pp. 20-22].

The birds kept mainly within the bullrushes and bushes of the creek, but could be called out by imitating the cries of a bird in distress. I frequently heard them singing, sometimes in the top of a low tree. Their notes are rather loud and quite clear, an interval of a few seconds occurring between each song. The three songs which I heard sung by the same individual March 31, were noted on the spot. In different places of the song occurred a low, short buzz, represented by stars in the following. The first song occupied about five seconds.

1. *Sweet, sweet * * * ear * * * sweet, sweet ear * * * sweet, sweet ear.*

2. *Sweet, sweet ear * * * sweet, sweet ear.*

3. *Sweet, sweet ear * * * sweet, sweet ear * * **

The birds were found on the west coast at lower Purisima cañon, and as far north as San Ignacio, consequently they are not nearly as localized as has before been supposed.

DIMENSIONS OF *GEOTHELYPIS BELDINGI*, FROM COMONDU.

Collector's No.	Sex	Date, 1888.	Wing.	Tail feathers	Bill from nostril.	Tarsus.	Remarks.
			mm.	mm.	mm.	mm.	
3023	♂	Mar. 11	61.	64.	9.5	22.	
3031	♂	" 12	63.5	64.	10.	23.	
3064	♂	" 13	61.5	62.5	9.5	23.	
3107	♂	" 24	62.5	64.5	10.	23.	
3137	♂	Apr. 9	62.	66.	9.5	23.	
3138	♂	" "	62.	62.	9.5	22.5	Tail worn.
3139	♂	" "	60.5	59.5	8.5	23.	" "
3160	♂	" 10	63.	66.	9.5	22.	
3171	♂	" 12	64.	65.	9.	22.	
3208	♂	" 17	63.5	63.5	9.	22.	Tail worn.
		Average.	62.3	63.5	9.4	22.5	
3028	♀	Mar. 12	60.	61.5	8.5	22.	Ovaries enlarged
3124	♀	Apr. 8	59.	61.	9.	21.5	Sitting.
3152	♀	" 10	61.5	64.	9	21.	
3163	♀	" 11	59.	59.	9.5	21.	Tail worn.
3172	♀	" 12	61.	62.	9.5	22.5	
		Average.	59.9	61.5	9.1	21.6	

277. *Icteria virens longicauda* (Lawr.)

LONG-TAILED CHAT.—Rare at the Cape region according to Mr. Belding. In thickets along the gulches east of San Quintin, Mr. Anthony found it common under 800 feet elevation. At Comondu they were common, and nesting in the bushes of the creek. The Mexicans call the birds "*arriero*," from the resemblance of its whistle to that made by a mule driver. When shown a male *G. beldingi* they said it was an "*arriero*," but when the chat and warbler

were exhibited together, they all agreed that the chat was the "*arriero*" and the warbler unknown to them. I encountered many such conflicting opinions regarding birds common among them. The phainopepla is a "*chinati*," (?) so is the black pewee, until they are shown the two side by side, when the pewee would be left without a name.

278. *Sylvania pusilla pileolata* (Pall.)

PILEOLATED WARBLER.—Obtained at the Cape region by Messrs. Xantus and Belding. During spring migration Mr. Anthony has seen them from 800 to 2,500 feet elevation in the region of lat. 31° N. Mr. Belding has taken three ♀ specimens in Lower California sixty miles from San Diego, May 19. I found a few at Comondu in March, before the migration northward had ended.

279. *Setophaga ruticilla* (Linn.)

AMERICAN REDSTART.—A female was shot by Mr. Belding at Miraflores February 24, 1883.

280. *Motacilla ocularis* Swinh.

SWINHOE'S WAGTAIL.—Mr. Belding captured a single specimen at La Paz January 9, 1882.

281. *Anthus pensilvanicus* (Lath.)

AMERICAN PIPIT.—At San José del Cabo Mr. Belding saw a flock which remained as late as May 3. In winter Mr. Anthony has found them from the coast to 3,000 feet altitude and on San Pedro Martir he saw a few May 8, at an altitude of 9,000 feet. A flock numbering about twenty-five was seen by myself on Guadalupe Island, February 2, 1886, and one specimen secured. Specimens which were collected at Comondu in April were moulting.

282. *Anthus cervinus* (Pallas).

RED-THROATED PIPIT.—One specimen was obtained at San José del Cabo by Mr. Belding, February 7, 1883.

283. *Oroscoptes montanus* (Townsend.)

SAGE THRASHER.—Given from the Cape region as rare by

Mr. Belding. Mr. Anthony has met with it along the northwest coast in spring under 1,000 feet altitude. The only one which I saw on Guadalupe Island was shot January 7, 1886.

284. *Mimus polyglottos* (Linn).

MOCKINGBIRD.—Obtained at the Cape region by Messrs. Xantus and Belding. On the northwest coast Mr. Anthony says it breeds in the foothills just away from the shore, and is found up to 3,000 feet altitude. I saw two birds on Guadalupe Island March 16, 1886, and shot the female. On Santa Margarita Island and the peninsula they were everywhere common. The Mexicans had large young caged in April, 1888.

285. *Harporhynchus cinereus* Xantus.

ST. LUCAS THRASHER.—Very common at the Cape region according to Messrs. Xantus and Belding. Mr. Anthony has taken this species and the young at San Quintin in March, but saw none after the first week in April. I met with it throughout the overland route from Comondu to San Quintin.

286. *Harporhynchus redivivus* (Gamb.)

CALIFORNIAN THRASHER.—Mr. Anthony has found it as far south as El Rosario and on San Pedro Martir as high as 7,500 feet elevation. Mr. Belding shot a specimen near Valle Trinidad, where he reports it as rare. He also notes it from San Quintin.

287. *Harporhynchus crissalis* (Henry).

CRISSAL THRASHER.—"One specimen, the first ever taken in Lower California, was shot about the middle of May, 1885, ten or twelve miles northwest of San Pedro mountains from a company or family of four. The remaining three were very shy, and after pursuing them in every direction, about an hour, I reluctantly quit the chase as our animals needed water, and we knew we must travel two or three hours before finding any. This was but one of many

experiences while collecting in different parts of Lower California, when the want of water interfered seriously with my success. During this trip of two weeks, we passed two nights at different localities without a drop of water." (Belding in litt.)

288. *Campylorhynchus brunneicapillus* (Laf.)

CACTUS WREN.—Mr. Belding did not meet with it between San Rafael and San Pedro Martir. Mr. Anthony, however, has found it along the coast, and up to 1,500 feet altitude in the San Pedro Martir range of mountains.

289. *Campylorhynchus affinis* Xantus.

ST. LUCAS CACTUS WREN.—Found very commonly at the Cape region by Messrs. Xantus and Belding. I met with it throughout the peninsula south of San Quintin. All the specimens which I collected on the overland journey are referable to *C. affinis*, although remarkable in the profuse spotting of the underparts, and the intensity of these spots.

290. *Salpinctes obsoletus* (Say).

ROCK WREN.—Reported not rare at the Cape region by Mr. Belding. In the northwest Mr. Anthony has found it from the coast to 11,000 feet altitude, and on San Martin Island it was breeding. I found a few on Santa Margarita and Magdalena Islands, and at various localities northward.

291. *Salpinctes guadeloupensis* Ridgw.

GUADALUPE ROCK WREN.—Known only from Guadalupe Island. The life history of this species was published in Bull. Cal. Acad. Sci., Vol. II, pp. 308-312.

292. *Catherpes mexicanus punctulatus* Ridgw.

DOTTED CANON WREN.—Reported from the Cape region and Victoria Mountains by Mr. Belding. Mr. Anthony has met with it as high as 10,000 feet altitude on San Pedro Martir. The first ones I heard were far up the sides of the rocky walls that inclose Comondú. On April 28, 1889, I secured a male and four fledged young at San Sebastian.

293. *Thryothorus bewickii spilurus* (Vig.)

VIGORS'S WREN.—Collected on Cerros Island by Mr. Belding, Mr. Townsend and myself. Those which I secured in 1885 were in worn plumage, but suggested to Mr. Henshaw, who identified them, the possibility that they belonged to a local race. I saw some at Soledad Stock Ranch, and met with it again on the peninsula in the latitude of Cerros Island. Mr. Belding has recorded it from San Quintin, and Mr. Anthony reports it from the northwest coast in winter under 2,500 feet altitude.

294. *Thryothorus brevicaudus* Ridgw.

GUADALUPE WREN.—Known from Guadalupe Island by two specimens collected by Dr. Palmer in 1875, and the seven which I obtained February 16, 1887. (See Bull. Cal. Acad. Sci., Vol. II, pp. 312-313.)

295. *Troglodytes aedon parkmanii* (Aud.)

PARKMAN'S WREN.—Mr. Belding found it to be rare on Cerros Island, and collected a specimen at La Paz.

296. *Cistothorus palustris paludicola* Baird.

TULE WREN.—Obtained only at San José del Cabo by Mr. Belding. On March 7, 1889, I shot a female among the mangroves on Santa Margarita Island, and the year before a Mexican boy brought one to me, which he had killed with a stone; the bird was moulting, having lost all of its tail feathers.

297. *Sitta carolinensis aculeata* (Cass.)

SLENDER-BILLED NUTHATCH.—Found in the Victoria mountains of the Cape region by Mr. Belding. In the pines on San Pedro Martir Mr. Anthony found it nesting from 7,500 to 10,000 feet altitude.

298. *Sitta canadensis* Linn.

RED-BREASTED NUTHATCH.—A small colony was found among the pines on Guadalupe Island. (See Bull. Cal. Acad. Sci., Vol. II, pp. 313-314).

299. *Sitta pygmæa leuconucha* Anthony.

WHITE-NAPED NUTHATCH.—Found by Mr. Anthony in the pines on San Pedro Martir from 7,000 to 11,000 feet altitude; nesting in April and May. (See these Proceedings, pp. 77-78.) Mr. Belding has seen one of the pygmy nuthatches at Hansen's, which is likely to be this subspecies.

300. *Parus inornatus griseus* Ridgw.

GRAY TITMOUSE.—“A few were found at the base of San Pedro Martir during late summer and fall; frequents the live oaks and cottonwoods, 2,500 to 3,000 feet elevation.” (Anthony).

301. *Parus inornatus cineraceus* Ridgw.

ASHY TITMOUSE.—Collected in the Victoria Mountains by Mr. Belding above an altitude of 3,000 feet.

302. *Parus gambeli* Ridgw.

MOUNTAIN CHICKADEE.—Found by Mr. Belding in the pine region about Hansen's. Mr. Anthony met with it among the pines of San Pedro Martir, nesting from 7,500 to 10,000 feet altitude.

303. *Chamæa fasciata henshawi* Ridgw.

PALLID WREN-TIT.—Mr. Anthony, who has collected specimens in the vicinity of Ensenada, San Fernando, and on San Pedro Martir up to 10,000 feet altitude, tells me that they are all referable to this race. Mr. Belding has heard wren-tits on San Pedro Martir and at San Quintin. I heard them in May, 1889, at El Rosario, among some thick willow growth.

304. *Psaltiriparus minimus californicus* Ridgw.

CALIFORNIAN BUSH-TIT.—According to Mr. Anthony, it is common from El Rosario northward, and from the sea-level to 9,000 feet altitude.

305. *Psaltiriparus minimus grindæ* (Belding).

GRINDA'S BUSH-TIT.—Obtained in the San Francisco and Victoria Mountains by Mr. Belding.

306. *Anuriparus flaviceps* (Sund.)

VERDIN.—A common species throughout the peninsula, as noted by all observers. Mr. Belding doubts if it occurs on the peninsula north of lat. 32° , unless on the eastern side. Nests were found sometimes in mesquite trees, but usually in *chollas*. At Comondu, in April, I found young large enough to care for themselves, and nests containing fresh eggs.

307. *Regulus calendula* (Linn.)

RUBY-CROWNED KINGLET.—Mr. Belding found it moderately common in the Victoria Mountains in February. On San Pedro Martir Mr. Anthony saw it up to 11,000 feet altitude, and down to the coast in winter and spring. A few were found in the pines the last of April, at 8,500 feet elevation.

308. *Regulus obscurus* Ridgw.

DUSKY KINGLET.—Known only from Guadalupe Island. For notes of habits and description of nest and eggs, see Bull. Cal. Acad. Sci., Vol. II, pp. 314–316.

309. *Polioptila cœrulea* (Linn.)

BLUE-GRAY GNATCATCHER.—Common at the Cape region, and also found in the Victoria Mountains by Mr. Belding. I obtained a single specimen at San Julio, near Comondu, in March, 1888.

310. *Polioptila plumbea* Baird.

PLUMBEOUS GNATCATCHER.—Collected at Cape St. Lucas by Mr. Xantus. Mr. Belding has recorded it as very common at the Cape region. I found it on Santa Margarita Island, and from the west coast to the Gulf in about lat. 26° N., and also near the west coast in lat. 28° N.

311. *Polioptila californica* Brewst.

BLACK-TAILED GNATCATCHER.—This species (?) was noted by Mr. Belding from Santa Rosalia Bay. Mr. Anthony says it breeds at San Fernando, and has been found by him at 5,000 feet altitude.

312. *Myadestes townsendii* (Aud.)

TOWNSEND'S SOLITAIRE.—The only note of occurrence of this species is from Mr. Anthony's letter, saying he found a single bird in the fall in a juniper thicket, at an altitude of 2,400 feet.

313. *Turdus ustulatus* (Nutt.)

RUSSET-BACKED THRUSH.—Seen at Hansen's as late as May 14, 1884, by Mr. Belding, and after the middle of May southeast of San Rafael.

314. *Turdus aonalaschkei* Gmel.

DWARF HERMIT THRUSH.—Mentioned by Mr. Belding as common and possibly resident in the Victoria Mountains. I shot three birds in 1886, which had wandered to Guadalupe Island. In January, 1888, I saw a few on Santa Margarita Island.

315. *Turdus migratoria propinqua* Ridgw.

WESTERN ROBIN.—Found at Ensenada, common in April, by Mr. Belding, and at San Rafael in winter. On the northwest coast Mr. Anthony found them common during winter in the first ranges of hills; their food was principally manzanita berries. A few were seen as late as May 10, at an altitude of 9,000 feet; none were seen by him south of San Quintin. On Guadalupe Island I shot three birds in January, 1886.

316. *Merula confinis* (Baird).

ST. LUCAS ROBIN.—First obtained by Mr. Xantus at Todos Santos, and afterwards in the Victoria Mountains by Mr. Belding. None of the people of whom I enquired knew of any such bird, and I saw none on any of my trips.

317. *Hesperocichla nœvia* (Gmel.)

VARIED THRUSH.—The only record is of the single bird which I shot on Guadalupe Island March 4, 1886.

318. *Sialia mexicana* Swains.

WESTERN BLUEBIRD.—Common during migration, according to Mr. Anthony, from 2,000 to 11,000 feet altitude, and a few he thinks may breed on the top of San Pedro Martir. Mr. Belding saw several pairs at San Rafael in May.

319. *Sialia mexicana anabelæ* Anthony.

ANABEL'S BLUEBIRD.—Not observed below 7,000 feet by Mr. Anthony. It was very common throughout the pine belt. (See these Proceedings, pp. 79–81.)

320. *Sialia arctica* (Swains.)

MOUNTAIN BLUEBIRD.—Three birds were seen by me on Guadalupe Island in the winter of 1885–6.

PROCEEDINGS.

January 21, 1889.—STATED MEETING.

The PRESIDENT in the chair.

The following were proposed for membership:

Lyman Belding, Waldemar Lindgren, James E. Mills,
Volney Rattan, Townshend S. Brandegee.

Additions to Museum:

40 bird skins, 750 specimens of insects, 6 specimens of
Pholas, specimens of fossil shells, specimens of reptiles,
donated by R. C. McGregor.

Skin of White Swan, donated by C. W. Kellogg.

The following paper was read:

The Total Eclipse of the Sun, Jan. 1st, 1889, by E. J.
Molera.

The following papers were read by title:

New Species of Californian Mammals, by C. Hart
Merriam.

Song Notes of Birds, by L. Belding.

Petrographical Notes on Baja California, Mexico, by W.
Lindgren.

Review of the Erythrininæ, by C. H. and R. S. Eigen-
mann.

Botanical Notes, by Mary K. Curran.

Report upon a Collection of Birds from Lower California,
by W. E. Bryant.

February 4, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Library:

From correspondents	133
By donation.....	8
By purchase	93

The following paper was read:

The Acorn and the Oak, by T. H. Hittell.

February 18, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Addition to the Museum:

Fossil Elephant's Tusk, donated by C. H. Burnham.

The following paper was read:

On Crinoids, by George Hewston.

March 4, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Townshend S. Brandegee, Waldemar Lindgren, Volney Rattan, James E. Mills and Lyman Belding were elected resident members.

The following were proposed for membership:

C. C. Reidy, E. J. Wickson.

Donations to Museum:

Specimen of Limonite, by F. Gutzkow.

Egg containing two specimens of *Gordius* and a fungous growth, donated by P. Rossi.

Photographic slides of the solar corona, donated by E. J. Molera.

The President announced the death of Seth Cook and Dr. Jules C. A. de Tavel, members.

The following papers were read:

Earthquakes in California, 1888, by E. S. Holden; read by E. J. Molera.

Notes on Corea, by Lucius H. Foote.

March 18, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to library:

From correspondents.....	121
By purchase.....	6
By donation.....	1

The following paper was read:

Names of Colors, by H. H. Behr.

April 1, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to library:

From correspondents.....	60
By purchase.....	5
By donation.....	3

Dr. Trembley presented Reports on the Meteorology of Oakland for 1887 and 1888.

The following paper was read:

Water Motors and Water Meters, by F. Gutzkow.

April 15, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Addition to Museum:

Specimen of fish from Lost River, Oregon, donated by
J. D. Redding.

Additions to Library:

From correspondents	53
By purchase.....	5
By donation	4

Mr. Gutzkow described some peculiar Alumina deposits.
A discussion on Aluminium followed.

The following paper was read:

Elements and Ephemeris of Barnard's comet, by J. M.
Schaeberle, communicated by Prof. Holden.

The President called attention to the volume of Proceedings just finished and ready for distribution.

The following vote of thanks was unanimously passed:

Resolved—That the thanks of the Academy be tendered to
Mrs. Mary K. Curran for the laborious, faithful and able
manner in which she has discharged her duties as Editor of
the Proceedings of the Academy.

May 6, 1889.—STATED MEETING.

The PRESIDENT in the chair.

A curious mask of Aztec origin, belonging to Mr. Carl
Clark, was exhibited.

Additions to Library:

From correspondents	107
By purchase.....	7
By donation.....	3

The plans of the new Academy building were exhibited
and explained by Mr. S. W. Holladay.

May 20, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Museum:

Shark's Jaw, donated by Leo Eloesser.

Specimen of Cinnabar, donated by B. M. Newcomb.

Specimens of Insects from Durango, Mexico, donated by H. S. Durden.

Young viviparous Perch from Oregon.

Photograph of the Moon, donated by the Lick Observatory.

Additions to Library:

From correspondents	53
By purchase	6

The following paper was read:

The Duration of Individual Life in Insects, by H. H. Behr.

June 3, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Museum:

Eighteen specimens Echinoderms and specimens of Galena, donated by R. C. McGregor.

One specimen *Cryptochiton stelleri*, donated by J. Redlick.

Specimen of Salt from San Quintin, Lower California, donated by Jas. Randall.

Additions to Library:

From correspondents.....	90
By purchase.....	7
By donation	1

The following paper was read:

Nesting Habits of some of our Raptores, with Notes on the California Condor, by H. R. Taylor.

Mr. W. E. Bryant made a verbal report on his recent trip in Lower California.

June 17, 1889.—STATED MEETING.

VICE-PRESIDENT BEHR in the chair.

Additions to Museum:

3 specimens of Samoan tapa, donated by Rev. A. A. McAllister, Chaplain of U S.S. Trenton.

Specimen of *Prionus*, donated by Philip Thayer.

Additions to Library:

From correspondents.....	85
By purchase.....	5
By donation.....	4

The following paper was read:

Descriptions of the Nests and Eggs of Some Lower Californian Birds, by Walter E. Bryant.

July 1, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Museum:

Book of herbarium specimens, donated by John A. Collins.

Specimen of the young of a small Orthopterous Insect, donated by J. Josephs.

Specimen of Octopus and a young Shark, donated by C. A. Wentworth.

Specimen of silicified wood, donated by J. De Barth Shorb.

Additions to Library:

From correspondents.	67
By purchase.	6
By donation.	11

The following paper was read:

A Description of Some New Mammals, by Walter E. Bryant.

July 15, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Museum:

Specimen of *Cryptobranchus*, donated by H. H. Behr.

200 specimens of Plants, donated by P. S. Buckminster.

140 specimens of Insects, donated by Carlos Troyer.

Mounted specimen of *Urinator imber*, donated by Charles Fiebig.

Specimens of *Ereunetes pusillus*, *Thamnophilus multistriatus* and Swedish Finch, donated by F. O. Johnson.

5 specimens (4 species) of Mammals, donated by W. W. Price.

11 specimens of small Thrushes, donated by L. Belding.

Mr. E. J. Molera presented the trowel used to lay the corner-stone of the new building.

Mr. Wm. Lambert exhibited a living specimen of *Amblystoma*.

The following paper was read:

On the "Cirio" Tree, by T. S. Brandegees.

Mr. Carlos Troyer made a verbal communication regarding the Indian inscriptions in Placer county.

August 5, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Library:

From correspondents	161
By purchase	13
By donation	1

Mr. Gutzkow addressed the meeting on the subject of a new water-meter.

President Harkness presented specimens of *Peronospora viticola* and an undescribed *Cladosporium* from the wild vine, and made a few remarks concerning them.

The President announced the death of Adley H. Cummins, member.

August 19, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Museum:

Specimen of *Birgus latro* from Fanning Islands, donated by State Mining Bureau.

Specimen of *Athene novæ-zealandiæ* from New Zealand, donated by Samuel Macauley.

88 species of Shells. donated by Maurice Chaper.

Specimen of *Ostrea titon*, donated by John F. Burch.

Additions to Library:

From correspondents	103
By purchase	6

A vote of thanks was passed to M. Maurice Chaper for his donation of a valuable collection of shells.

Mr. Gutzkow addressed the assembly on the subject of Aluminium and its manufacture.

The following paper was read
On Amblystoma, by Walter E. Brown.

September 2, 1888. — SOUTH MEETING.

The PRESIDENT in the chair.

Additions to Library.

From correspondents.	2
By purchase	1
By donation	1

Dr. Geo. Engel read a paper on the Grasses of the State of Kansas.

September 9, 1888. — SOUTH MEETING.

The PRESIDENT in the chair.

J. S. Brown read a paper on the Grasses of the State of Kansas.

Additions to Library.

From correspondents.	2
By purchase	1

The following paper was read.

On the Grasses of the State of Kansas, by J. S. Brown.

September 16, 1888. — SOUTH MEETING.

The PRESIDENT in the chair.

Additions to Library.

Mr. J. S. Brown read a paper on the Grasses of the State of Kansas, by Rev. A. A. Allen.

Additions to Library:

From correspondents.....	98
By purchase.	7
By donation.....	1

Mr. T. S. Brandegee made a verbal communication concerning the Flora of Lower California, exhibiting photographs of some new species of Cactus.

October 21, 1889.—STATED MEETING.

The PRESIDENT in the chair.

F. H. Vaslit was proposed for membership.

Additions to Museum:

3 specimens of fish, donated by L. Belding.

Specimen of snake, donated by W. D. Bliss.

The reading of Mr. Brandegee's paper on Flora of Lower California, was postponed until the next meeting.

November 4, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Museum:

1 specimen of *Eutania*, and 1 arachnid, donated by W. D. Bliss.

1 specimen of *Fischeria*, donated by J. R. Scupham.

Additions to Library:

From correspondents.....	107
By purchase.....	54
By donation.....	3

The following paper was read:

On the Flora of Baja California, by T. S. Brandegee.

Mr. F. Lambertenghi addressed the meeting on Progress in Italian Law.

November 18, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Museum:

2 living specimens of *Crotalus cerastes*, donated by Mr. Quinn.

Dr. Behr made some remarks on the habits of rattlesnakes.

The following paper was read:

Euphorbiaceæ collected by T. S. Brandegee in Lower California, by Dr. C. F. Millspaugh.

December 2, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Museum:

1 specimen *Remora squalipeta*, donated by Dr. E. S. Clark.

1 specimen of the early stage of some Selachianoid fish, donated by Jerome B. Cox.

1 specimen vein matter forming a distinct cross, donated by Melville Attwood.

425 specimens (about 200 species) of Coleoptera, donated by F. C. Torrey.

4 skins of young Auk and 4 sea-birds' Eggs, donated by Mrs. W. J. Dodd.

Additions to Library:

From correspondents	215
By purchase	11
By donation	6

The following paper was read:

The Economy of Nature as Exemplified by Vegetable and Animal Parasites, by H. H. Behr.

December 16, 1889.—STATED MEETING.

The PRESIDENT in the chair.

Additions to Museum:

- 216 specimens of Insects, donated by R. C. McGregor.
- 40 specimens willow aphid (*Lachnus dentatus*), donated by G. P. Rixford.
- 56 specimens of Insects, donated by E. F. Lorquin.
- 5 specimens *Ctenucha multifaria*, donated by C. D. Haines.
- 1 specimen of larval form of *Ameles Mexicana*; 204 specimens of Lepidoptera, donated by H. H. Behr.
- 90 specimens of Lepidoptera, donated by Carlos Troyer.
- 1 Spider (*Lycosa*), donated by Miss M. E. Parsons.
- 8100 specimens of Insects, collected by the Lower California Expedition.
- 1300 species of European and Algerian plants, donated by E. St. C. Cosson, Paris.
- 300 species of Plants, donated by Department of Agriculture.
- 600 species of Plants, donated by T. S. Brandegee.
- 11 specimens of Birds, donated by Robert A. A. Wright.
- 4 specimens of Birds, from various donors.
- 17 specimens of Birds, donated by L. Belding.
- 212 specimens Birds, 120 Mammals and 50 Reptiles, collected by the Lower California Expedition.

44 specimens of Birds and 20 Mammals, collected by curator since May.

6 Eggs of Cactus Wren, donated by A. A. Caldwell.

2 Eggs of Sparrow Hawk and 2 of California Screech Owl, donated by R. M. Price.

10 Eggs of House Finch, donated by Robert Taylor.

5 Eggs of Barn Owl, donated by R. M. Jones.

3 Nests of Humming Birds, donated by J. B. Kent.

Additions to Library:

From correspondents.	42
By purchase.	7
By donation	1

The following papers were read:

The Lower California Expedition of 1889, by Walter E. Bryant.

The Economy of Nature as Exemplified by Vegetable and Animal Parasites, ii, by H. H. Behr.

The Nominating Committee reported the following ticket for the ensuing year:

President, H. W. Harkness.

First Vice-President, H. H. Behr.

Second Vice-President, George Hewston.

Recording Secretary, J. R. Scupham.

Corresponding Secretary, F. Gutzkow.

Treasurer, I. E. Thayer.

Librarian, Carlos Troyer.

Director of Museum, J. G. Cooper.

Trustees, C. F. Crocker, D. E. Hayes, S. W. Holladay, E. J. Molera, George C. Perkins, Irving M. Scott, John Taylor.

Another ticket was presented differing from the former only in having Joseph Le Conte for President and E. S. Clark for Librarian.

January 7, 1890.—ANNUAL MEETING.

The PRESIDENT in the chair.

The annual reports of the officers and Board of Trustees were received and referred to the Publication Committee.

The judges and inspectors of election reported the following officers elected for the ensuing year:

H. W. HARKNESS, *President*.

H. H. BEHR, *First Vice-President*.

GEORGE HEWSTON, *Second Vice-President*.

FREDERICK GUTZKOW, *Corresponding Secretary*.

J. R. SCUPHAM, *Recording Secretary*.

I. E. THAYER, *Treasurer*.

CARLOS TROYER, *Librarian*.

J. G. COOPER, *Director of Museum*.

Trustees.

CHARLES F. CROCKER,

D. E. HAYES,

S. W. HOLLADAY,

E. J. MOLERA,

GEORGE C. PERKINS,

IRVING M. SCOTT,

JOHN TAYLOR.

REPORT OF THE PRESIDENT.

In accordance with the custom which is pursued by this and kindred societies, we meet this evening to receive the reports of our officers during the past year and to cast a retrospective glance upon its history, the pages of which are about to be closed.

As you have learned by the reports which have been read this evening, much good work has been accomplished during the year, and we enter upon another with renewed confidence.

There are upon the roll of membership the names of two hundred and fifty-seven members. Five have joined during

the year and one has resigned. During the year we have lost five members by death, viz., Adley H. Cummins, Dr. De Tavel, S. P. Dewey, Seth Cook and F. O. Layman.

The volume of proceedings of the preceding year was published and distributed early in this, and the proceedings of the present year will be ready, no doubt, for distribution within a month from the present date.

The Recording Secretary has been constant in his attendance at the meetings, and has the records of the Academy in good order. Our Treasurer's report speaks well for his care and business ability. Large sums have through him been received and expended, and much confusion in our accounts would have resulted were it not for his care and watchfulness.

In his report, the Librarian informs us that large additions have been made to our library, and our large exchange list has been increased. By the help of his able assistant, the books as received have been catalogued, and the results will be set forth in our annual publication.

The Director of the Museum, owing to demands upon his time incident to his profession, has been compelled to content himself with but a general oversight of our collections.

For the lack of room, but a small portion of our collection is available for study, and no method can be suggested by which the difficulty can be remedied until removal to our new and enlarged quarters. Many of our plants and insects are suffering from the dampness of our rooms; and the Ward collection, the generous gift of Messrs. Crocker and Stanford, which is now stored in the basement of the building, is suffering greatly from a like cause. The large additions which are being made, serve to remind us that there is an urgent demand for room not only for our collections, but also for our Library. There is also urgent need for the binding of books and pamphlets which are accumulating rapidly.

The members of this Association should ever bear in

mind that its present and its future success depends upon the results of the labors of the specialists in the various departments of our Academy.

In no former period of our history has there been more zealous and profitable work accomplished.

Most of the curators of the different departments have performed their work in a manner which is satisfactory to our society. As was anticipated, however, some of them were so immersed in business incident to their several vocations that they were unable to complete the work assigned them. A number of them, however, deserve special mention upon this occasion for zealous and untiring work in the field and careful and painstaking labor in the work-room. They have classified and arranged the gleanings in so thorough a manner that they will be of great service, not only to the workers of the present day, but will become of lasting benefit to science in the future.

The Curator of Botany, Mrs. T. S. Brandege, is deserving of the thanks of the well-wishers of this Association for the tireless energy with which she has pursued the work which was assigned her. During the past year she has visited distant and unfrequented localities in the interest of her department, and very large and valuable additions to the Herbarium have been made as the result of her energetic work, and our publications bear evidence of careful and painstaking study in her department.

To Mr. T. S. Brandege the Society is also indebted for valuable donations of plants collected on the peninsula of Lower California, and our publication is enriched by a monograph by him describing the more important plants which he secured. Undertaking at his own expense the exploration of that interesting field, he traversed nearly the entire length of the peninsula and brought to us as a result nearly 1,000 species of the flora of that region.

Our Curator in Ornithology, Walter E. Bryant, deserves the thanks of the Society for constant and unremitting

attention to his department of scientific work. Early in the year he embarked for Lower California and for months was engaged in the exploration of the country extending north from Magdalena Bay nearly to the California boundary. During that period he made a large collection of birds, 216 in number, and of mammals 121, which, it is needless to say, will be of the greatest value to our collection.

In addition to the work performed in Lower California, Mr. Bryant has been actively engaged since his return in the collection of our local fauna, besides recording the results of his year's labor, which will appear in the forthcoming volume of our proceedings.

To Mr. Bryant we are indebted for a revival of interest in ornithological work, and his department, heretofore much neglected, will, we feel confident, take the position in future to which it is justly entitled.

From Mr. Chas. Haines, who visited Lower California in the employ of the Academy, we have a valuable collection of insects of about 1000 species.

Numerous papers have been presented which in number and value will compare favorably with those of any preceding year.

From the report of the Trustees it will be seen that our new building is progressing towards completion, and we may hope at no distant day to be in possession of quarters well adapted to our work.

REPORT OF THE CORRESPONDING SECRETARY.

The correspondence of the Academy during 1889 referred principally to the distribution of Vol. 1, New Series of our Proceedings, and to contributions to our library. There were received more than three hundred communications on that subject. It is gratifying to notice that the publications of the Academy have been in lively demand by kin-

dred societies in all parts of the globe and that offers of exchange have reached us from many scientific institutions with which we had previously no intercourse. There were written twenty-three letters, of some extent in addition to the customary short notices of the Librarian. At the commencement of the year a circular was printed and distributed among our foreign correspondents, directing their attention to the lacunæ existing in their publications, as shown in the catalogue of our library (which formed an appendix to our last issue), and requesting their co-operation in filling the same. This contributed much to save time, postage and reiterations. Of the 1500 printed copies of our last publication, about 250 were distributed to our members and about 600 to correspondents abroad.

REPORT OF THE TREASURER.

Submitting to you the following report of the business for the year just closed, your Treasurer has not attempted to segregate the details of the receipts and disbursements as closely as has been done in former years.

When the disbursements of the Academy were confined chiefly to rents, salaries, taxes, etc., it was customary for the Treasurer to report under those heads the amount expended.

The wider range of transactions for the past year incident to the erection of our new building, embraces more details than comes to the knowledge of your Treasurer.

The constitution places the management of all financial matters in the hands of your Trustees, who keep complete books of account, and by whom all receipts and disbursements are debited or credited to their proper account; and I refer you to the report they will submit for such particulars as are not embraced in the general summary I herewith present.

Balance in bank, January 1, 1889.....		\$2,936 06
Dues Active Members.....	\$1,251 00	
Interest on Crocker Fund.....	1,200 00	
Interest on money loaned.....	1,375 00	
Cash from Lick Trustees	288,969 40	
Rent of Fence (front of Market St. Property).....	425 00	
		<u>293,220 40</u>
		<u>\$296,156 46</u>
January 1, 1890, balance in bank.....		\$25,164 58
By amount disbursed from Crocker Fund as per vouchers.....	\$960 00	
By amount disbursed from Gen- eral Fund as per vouchers.....	270,029 93	
By Collection Charges on Eastern Check.....	25	
By Interest on Overdraft.	1 70	
		<u>270,991 88</u>
		<u>\$296,156 46</u>

SUMMARY—GENERAL FUND.

Balance on hand January 1, 1889.	\$2,185 04	
Receipts.....	292,020 40	
	<u>\$294,205 44</u>	
Disbursements.	270,031 88	
Balance, January 1, 1890.....		\$24,173 56
CROCKER FUND.		
Balance on hand January 1, 1889.	\$751 02	
Receipts.....	1,200 00	
	<u>\$1,951 02</u>	
Disbursements.....	960 00	
Balance, January 1, 1890.....		<u>991 02</u>
		<u>\$25,164 58</u>

REPORT OF THE LIBRARIAN.

The 37th Annual Report of the Librarian for the year 1889 is respectfully submitted.

The accessions to the Library during the past year number 2193, of which 1858 publications have been received from 101 domestic and 218 foreign correspondents, 65 by donation and 270 by purchase.

Donations have been received from Melville Attwood, A. Blytt, Ferdinando Bosari, W. E. Bryant, Lic. Eustaquio Buelna, Chas. Burckhalter, Thos. L. Cascy, Maurice Chaper, F. L. Clarke, Ernest St. C. Cosson, M. K. Curran, James D. Dana, D. C. Danielssen, Gen. Thos. Ewing, Capt. M. Fletcher, R. Gottgetreu, F. Lambertenghi, Geo. N. Lawrence, Dr. Castro Lopez, A. Marques, James E. Mills, H. H. Moore, J. S. Newberry, Zelia Nuttall, F. F. Payne, E. Regel, Dr. Saint-Lager, C. S. Sargent, Henri de Saussure, Robert Schram, F. Lamson Scribner, R. E. C. Stearns, Prof. W. Trelease, Dr. J. B. Trembley, Dr. Sereno Watson.

The following publications have been subscribed for :

Nature, The Ibis, Journal of Botany, Annals and Magazine of Natural History, Science, Memoirs of the Torrey Club, The American Naturalist, Century Dictionary, West American Scientist.

A detailed list of the Additions to the Library is published with the volume of Proceedings for the year.

REPORT OF THE DIRECTOR OF THE MUSEUM.

The past year has been one of increased activity in the growth of collections in nearly all branches, both by the work of our collectors in Lower as well as Upper California, and through the liberal contributions of members and friends. There is no doubt that with new and sufficient accommodations the Museum will make a highly valuable

and interesting display, while it will also increase faster through exciting more public interest. The Curators' reports show that there have been large accessions both in Zoology and Botany during 1889, with some increase also in the other departments. The want of means for working at specimens and for making exchanges of duplicates with other institutions has always been a drawback to the proper development of the Museum, and cannot be remedied until the new building is occupied. The collections on hand continue to be as carefully preserved as circumstances will permit, but want of room allows of the exhibition of only a part of them. Considering that most of the Curators have worked without compensation until within a few years past, the condition of the Museum is highly encouraging.

The accessions which are not included in the Curators' reports are classified as follows :

Anthony, A. W. San Diego, Cal. : 2 living specimens of *Xerobates agassizii*.

Attwood, Melville. San Francisco: 1 specimen of vein matter.

Behr, Dr. H. H. San Francisco : 1 specimen of larval form of *Ameletus mexicana*.

Belding, L. Stockton, Cal. : Specimens of fresh water shells. *Margaritana falcata*, *Limnaea stagnalis*, *Physa Gaudii* and *Pemphigolux* sp?; also 3 small fish from Lake Tahoe.

Bliss, Walter D. Carson City, Nev. : 1 living specimen of *Arachnida*.

Burch, John F. San Luis Obispo County (through Charles F. Crocker) : 1 fossil oyster shell.

Burroughs, C. H. San Francisco : Piece of fossil tank collected by P. D. Eckardt.

Chapuis, Maurice. Paris, France : 88 species of shells.

Clark, Dr. E. S. San Francisco: 1 specimen of *Bemora squalepata* from near Sandwich Islands.

Coven, Miss Alice, Oakland, Cal.: 2 specimens (2 species) land shells, from Monterey County.

Cox, Jerome B., San Francisco: 1 specimen of early stage of *Selachianoid* fish from Sitka Bay, Alaska.

Durden, H. S., San Francisco: Insects from Durango, Mexico.

Eloesser, Leo, San Francisco: Shark's jaws, complete.

Gutkow, Frederick, San Francisco: Specimen of *limonite*.

Haines, C. D., Oakland, Cal.: 5 specimens of *Ctenucha multifaria*.

Joseph, James, San Francisco: Specimen of young *Orthoptera*.

Lorquin, E. F., San Francisco: 56 specimens of insects, mostly *Orthoptera*.

Lower California Expedition of 1889: 8100 specimens of insects; 50 reptiles in alcohol.

McAllister, Rev. A. A., U.S.F.S. Chicago: Model of Samoan canoe.

McAllister, Rev. A. A. (through Gen. J. F. Houghton): 3 specimens of Samoan tapa.

McGregor, R. C., San Francisco: 920 specimens insects; 6 specimens of *Pholas*; specimens of fossil shells; specimens of reptiles in alcohol; 3 crustaceans; specimens of galena and 18 specimens Echinoderms.

Newcombe, B. M., Napa County, California: Specimen of cinnabar.

Parsons, Miss M. E.: 1 specimen *Arachnidæ* (*Lycosa*?).

Precht, Carl, San Francisco (through Dr. H. H. Behr): 1 specimen *Cryptobranchus* in alcohol.

Quinn, J. C., Oakland, Cal.: 2 living specimens *Crotalus cerastes*, from Mojave Desert.

Randall, James, San Quintin, Lower Cal.: Specimen of sea salt from Lower California.

Redding, J. D., San Francisco: 1 specimen of *Moxostoma* sp.?

Redlich, J., San Francisco: 1 specimen of *Cryptochiton stelleri*.

Rixford, G. P., San Francisco: 40 specimens of willow aphid (*Lachnus dentatus*).

Rossi, P., San Francisco: A hen's egg containing two specimens of *gordius* and a fungous growth.

Skorb, J. de Barth, Anaheim, Cal.: Specimen of chalcid.

Spiers, James, San Francisco: 1 living specimen of *Xerobates agassizii*.

State Mining Bureau, San Francisco: 1 living specimen *Birgus latro*.

Thayer, Phillip, Oakland, Cal.: 1 specimen *Prionus*.

Thorrey, F. C., Oakland, Cal.: 425 specimens, about 200 species, Coleoptera.

Troyer, Carlos, San Francisco: 140 specimens of insects; 90 specimens of Coleoptera.

Wentworth, C. A., San Francisco: 1 *Octopus* and 1 young shark in alcohol.

Wright, Fred. R., San Francisco: Specimen of wood containing acorns deposited by the Californian Woodpecker.

REPORT UPON THE DEPARTMENT OF MAMMALS AND BIRDS.

BY WALTER E. BRYANT, CURATOR.

Until the middle of February, 1889, the curator's time was mainly occupied by preparations for an expedition to Lower California and in assisting to organize the California Ornithological Club, in addition to routine duties.

Upon his return from Lower California a report was commenced upon the ornithology of that trip, in which is included the results of his investigations made in 1888, and the researches of all earlier explorers, making it an annotated catalogue of the birds of Lower California, the first one to be published.

Two other papers have been published, one upon four kinds of undescribed birds' eggs, the other descriptive of two new mammals. Another paper, upon the genus *Amblystoma* and its allies, was read August 19. The museum circular, No. 2, treating of methods for preparing mammals and birds has been long delayed from publication owing to the lack of suitable provision being made for the proper care of the fresh material when received. Heretofore the preparation of specimens received in the flesh has devolved upon the curator, and almost invariably when time could not well be spared for it.

The study collection of mammals and birds is greatly in need of additional specimens from various localities on this coast, and it is hoped that the society will recognize the importance of adding largely to the collection during the coming year and provide facilities for obtaining the same.

No change has been made the past year in the exhibition collection, nor is it desirable to do so until other accommodations are available for the better display of the specimens.

In the study collection the arrangement has been the same as the year before, no change being practicable until unlimited space and suitable cases are furnished for its reception. The study series has so far outgrown the space allotted to it that the temporary disposal of it in boxes makes it often difficult to readily find certain specimens when wanted.

The encroachment of routine work upon that of investigation and publication has prevented the complete labeling and cataloguing of part of the acquisitions for the year, and prevented certain field studies at times when climatic circumstances presented opportunities that come but seldom in a life time. I refer to the recent long continued rains, when inundated districts, notably parts of the Sacramento Valley and marshes of the Bay shore, offered rare inducements for the study and collection of mammals.

Could these clerical duties have been placed in the care of some competent assistant, the field work of 1889 and its results might have long stood unequalled in regard to valuable accessions and interesting information for publication.

The field work that has been done consists of a three and one-half months' expedition to Lower California; about three weeks spent at different times in Sonoma County; two trips of a week each to Monterey County, and a few excursions of a day each in the vicinity of San Francisco; in all about five months of field work, including time consumed in traveling.

An attempt was made in Oakland to study certain small mammals in captivity, but owing to inability to give constant daily care to the subjects that had been secured it was not successful.

Four collections of birds have been received on deposit for safe keeping and the use of the curator, they aggregate 4711 specimens, apportioned as follows:

Collection of W. W. Price,	2303
“ “ F. O. Johnson,	1070
“ “ R. C. McGregor,	943
“ “ T. S. Palmer,	395

During the year several small lots of birds' skins have been received for identification and returned, named, to the owners.

Twenty-nine specimens have been borrowed for examination and two loaned for the same purpose.

Received by donation from:

Badger, Geo. B., San Leandro, Cal.: 7 *Arvicola* in flesh.

Belding, L., Stockton, Cal.: 48 birds' skins from various localities.

Bliss, W. D., Carson City, Nev.: 1 specimen *Chiroptera* in flesh.

Bliss, W. S., Carson, City, Nev.: Albescant specimen of *Tamias asiaticus quadivittatus*.

Bryant, D. S., Healdsburg, Cal.: 3 *Hesperomys* sp.? and 1 *Spermophilus grammurus douglassi*, in flesh.

Bryant, Walter E., Curator: 46 birds' skins; 19 mammal skins.

Caldwell, A. A., Oakland, Cal.: 6 eggs of *Campylorhynchus brunneicapillus*.

Comstock, Chas. N., Oakland, Cal.: 1 *Accipiter velox*, and 1 *Dryobates pubescens gairdneri* in flesh.

Dickinson, Col. P. T., Alameda, Cal.: 1 nest and 4 eggs of *Passer domesticus*.

Dodd, Mrs. W. J., San Francisco: 4 skins of young *Alcidæ* and 4 sea birds' eggs from Alaska.

Emerson, W. Otto, Haywards, Cal.: 1 skin of *Thomomys talpoides bulbivorus* with cranium; 7 young *Mus* sp.?

Fiebig, Charles, Eureka, Cal.: Mounted specimens of *Urinator imber*, *Ceophlæus pileatus* and *Phalaropus lobatus*.

Johnson, F. O., Oakland, Cal.: 1 skin of *Tamias asiaticus macrohabdotes*; 1 mounted *Ereunetes pusillus*, and 2 mounted foreign birds.

Jones, R. M., Oakland, Cal.: 5 eggs of *Strix pratincta*.

Kellogg, Chas. W., Oakland, Cal.: 1 *Dafila acuta* in flesh.

Kent, J. B., Oakland, Cal.: 3 nests of *Trochilidæ*.

Knox, Chas. W., Oakland, Cal.: 1 *Asio accipitrinus* in flesh.

Lorquin, E. F., San Francisco: 5 heads of *Callipepla*.

Lower California Expedition of 1889: 216 bird skins; 121 mammal skins.

Mucauley, S., Tauranga, N. Z. (through J. W. Wrenn, San Francisco): 1 skin of *Athene novæ-zealandiæ*.

McGregor, R. C., San Francisco: 4 skins of *Tamias asiaticus townsendi*; 8 skins of *Hesperomys* sp.? and 1 skin *Arctomys flaviventer* with crania; also 4 fœti of *Hesperomys* in alcohol; 8 skins of *Otocoris alpestris rubea*; 1 skin of *Petrochelidon lunifrons*; 5 *Tamias asiaticus townsendi* and 1 *Sciurus fessor* in flesh; 26 birds' stomachs; 1 skin *Scolecophagus cyanocephalus*, and 40 other skins Californian birds.

Morse, S. B., San Francisco: 1 *Tamias asiaticus ownsendi* in flesh.

Price, W. W., Oakland, Cal.: 2 skins of *Tamias asiaticus macrohabdotes*; 1 skin of *Scalops townsendi*; 1 mounted specimen each of *Tamias striatus* and *Spermophilus tridecemlineatus*.

Price, R. M., Oakland, Cal.: 2 eggs of *Falco sparverius*, and 2 eggs of *Megascops asio bendirei*.

Stephenson, C. V., Oakland, Cal.: 1 skin of *Colaptes cafer*.

Streator, Clark P., San Francisco: 18 skins of birds from British Columbia.

Taylor, Robert, Oakland, Cal.: 10 eggs of *Carpodacus mexicanus frontalis*.

Vaslit, F. H., San Francisco: 1 cranium each of *Canis latrans*, *Mephitis mephitis* and *Vulpes* sp.?

Winston, B. C., Oakland, Cal.: 1 *Didelphys virginiana* in flesh.

Wright, Robt. A. A., S.S. Zealandia: 11 bird skins from Alaska and Siberia.

Zimmermann, William, San Miguel, Cal.: 1 nest of *Icterus bullocki*.

Received by purchase, 19.

REPORT UPON THE DEPARTMENT OF BOTANY.

By KATHARINE BRANDEGEE, CURATOR.

The cases allotted to the herbarium are all full, and the accessions for the past year, as well as all other plants which may be received, can only be poisoned and tied in packages until the long hoped for new quarters are ready.

The herbarium has received the following additions during the year:

By donation from:

Anderson, Dr. C. L., Santa Cruz, Cal.: A valuable fascicle of mounted *algæ*.

Brandegee, Katharine, Curator: 1875 species from various localities.

Brandegee, T. S., San Francisco: 1000 species.

Buckminster, P. S., Angels, Cal.: 200 species.

Cosson, Ernest St. C., Paris, France: 1300 species European and Algerian plants.

Geological Survey of Canada: 200 species.

McCormick, Ensign, and *Chas. H. Townsend*, U.S.F.C.S. Albatross: 70 species.

Rixford, G. P., San Francisco: 100 species.

From various friends and members, about 200 species.

By exchange from:

Department of Agriculture: 400 species.

Trelease, Prof. Wm., Shaw School of Botany: 300 species.

REPORT OF THE BOARD OF TRUSTEES.

BY CHARLES F. CROCKER, PRESIDENT.

The Board of Trustees of the Academy, in accordance with the provisions of Section 4 of the Constitution, presents herewith its annual report for the year 1889:

Members of the Board duly elected, met in the office of the Trustees January 21st, and organized by electing Charles F. Crocker, President, S. W. Holladay, President *pro tem.*, and Charles Stephens, Secretary.

Duly executed bonds of the Treasurer and Director of Museum were received, examined and approved in accordance with the provisions of Section 3 of the Constitution; subsequently, the bond of the Librarian was received and approved. A Prudential Committee was appointed, consisting of Trustees Holladay, Perkins and Molera.

The Board immediately began the consideration of plans and contracts for the construction of the Academy building on Market street, and contracts were made at different dates

which, at the present time, nearly cover the construction of the entire building, and the work has progressed as rapidly as we could reasonably expect considering the very substantial nature of the work and the delay in obtaining a sufficient supply of certain kinds of material. A competent and reliable superintendent was appointed, whose duty it is to examine and report on all materials used, and exercise a general control over the contractors for the benefit of the Academy. We expect the Academy will be able to occupy its new quarters before the expiration of the present year.

A number of communications were received during the year from the Council, asking for appropriations of money to defray the necessary expenses for carrying on scientific investigation and for the publication of the proceedings of the Academy and bulletins. These requests were granted in each instance, and form a much heavier item of expense than usual for such purposes.

In February, the attorney of the Board was instructed to bring suit to defend the right and title of the Academy to the lot on First Avenue near Point Lobos Avenue, which had been taken possession of by the City authorities and upon which a school-house has been erected. This suit is now in course of litigation.

In July, your Board of Trustees was notified by the Lick Trustees that they would not continue to loan money in small sums, as requested from time to time, upon the note of the Academy, but that they would require a note and a mortgage of the Market street property to be executed to the Lick Trustees for \$300,000 or \$350,000, and that the Trustees of the Academy must receive in cash the difference between what had already been advanced and the total amount to be loaned. Application was made by the Attorney of the Board to the Superior Court of this City and County for permission to mortgage the property on Market street as above. The application was heard on the 9th day

of August, and thereupon an order was made granting permission to execute said mortgage. Accordingly, on the 2d of September, a note and mortgage for \$300,000 were signed, the interest upon previous notes adjusted to that date, and the difference received in cash; of which amount, \$150,000 not considered necessary for immediate use was loaned out on demand with good security.

A settlement was made with Miss Flood, the owner of the adjoining building, for the ownership of the party wall, according to a contract which had been made in 1887, and \$4,500 was paid.

The receipts from the Crocker Scientific Investigation Fund have amounted to \$1,200, and the disbursements for expenses properly chargeable to it were \$960.00.

The Museum, Library, and all personal property of the Academy is in good condition, but we realize that the completion of the new building, and removal of the books and collections of specimens to a dry and fire-proof building will be a great advantage.

The Bank of California was selected as a depository for the funds of the Academy. The bonds belonging to the Crocker Scientific Investigation Fund, deeds, contracts and all valuable papers are kept in a box rented for the purpose in the vaults of the Safe Deposit Company.

Inasmuch as some discussion and communication has been had between members of the Academy and the Board of Trustees, relative to certain matters of detail in the construction of the new building, and more particularly relative to a contract which was made for concrete beams and flooring, your Trustees have thought proper to make reference to the matter in this report, saying that the most careful and searching inquiry was made into this manner of construction, in which all of the Trustees, as well as the architect, took part, and subsequently, after portions of the work had been finished, it was submitted to practical tests, which were successful in every particular, and the Trustees were unanimous in adopting this method of construction.

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ADDITIONS AND CORRECTIONS.

Page 58, second line from bottom, insert "Haywards" before "April 20, 1875."

" 69, in song No. 2, last note should be C instead of D.

" 74, first line, for "*Oreortyx picta confinis*" read "*Oreortyx pictus confinis*."

" 74, third line, for "*Oreortyx picta plumifera*" read "*Oreortyx pictus plumiferus*."

" 75, before table of dimensions, for "*Oreortyx picta confinis*" read "*Oreortyx pictus confinis*."

" 79, sixteenth line, for "Adult ♂" read "Adult ♀."

" 307, second line from bottom, for "Stephen's" read "Stephens's."



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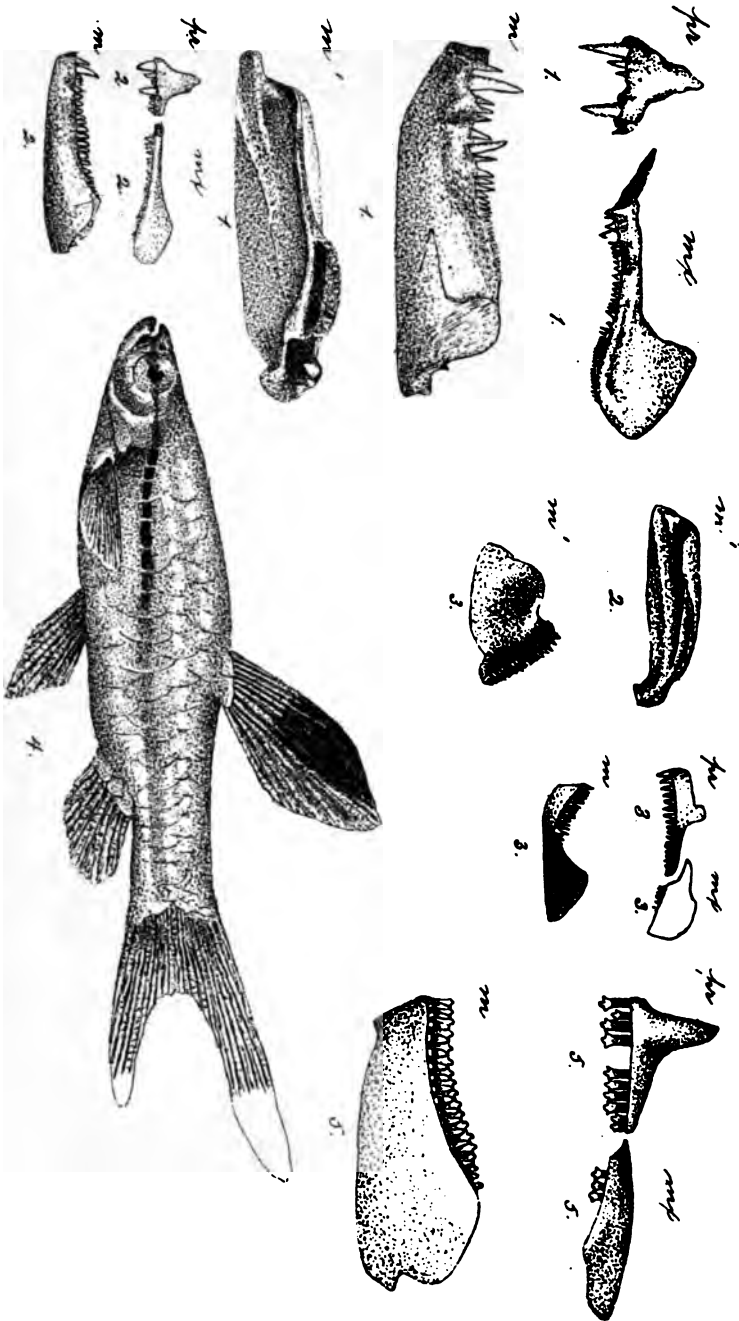
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PLATE I.





C. E. Faxon del.

LYROCARPA XANTI.

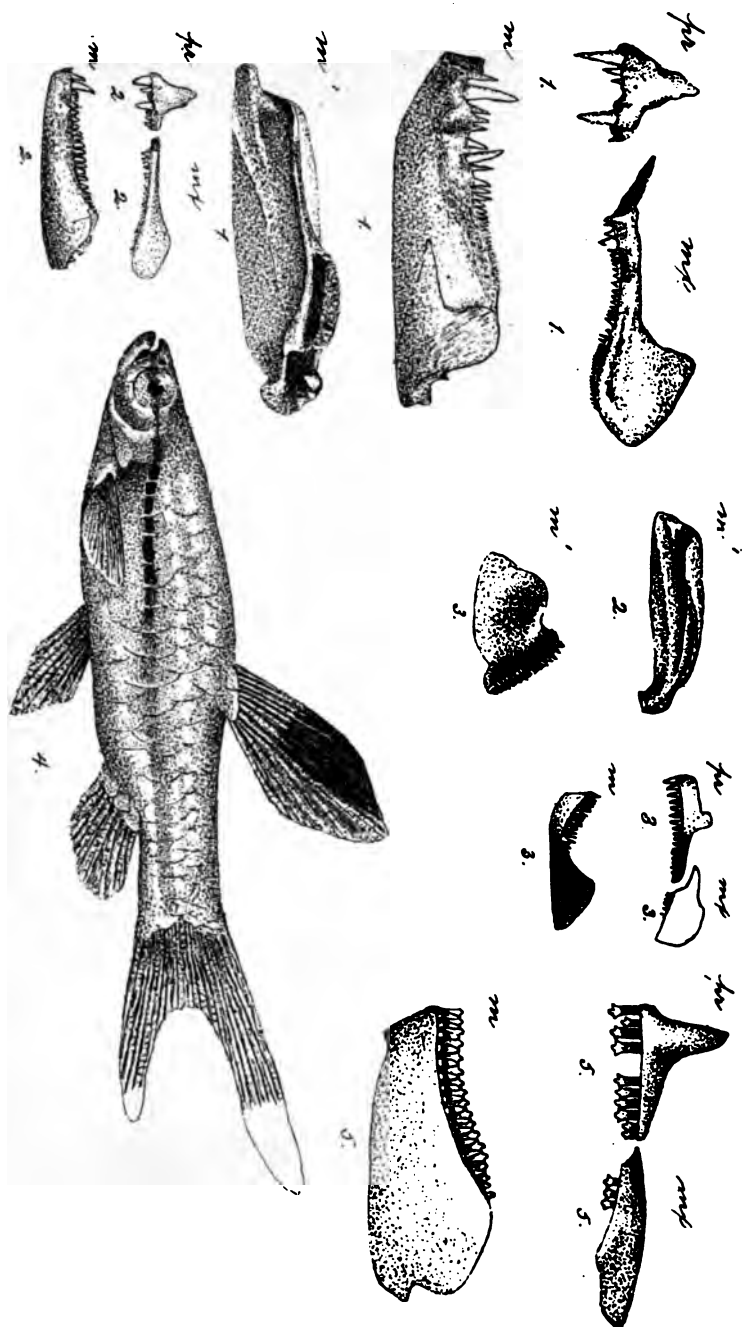
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C. F. Faxon del.

POLYGALA APOPETALA.

PLATE I.





C. E. Faxon del.

LYROCARPA XANTI.



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POLYGALA APOPETALA.



CEFAZON del.

POLYGALA APOPETALA.



C.E. Faxon del.

LOPEZIA CLAVATA.



C. E. R. del.

GONGYLOCARPUS FRUTICULOSUS.



MAMILLARIA HALEI.

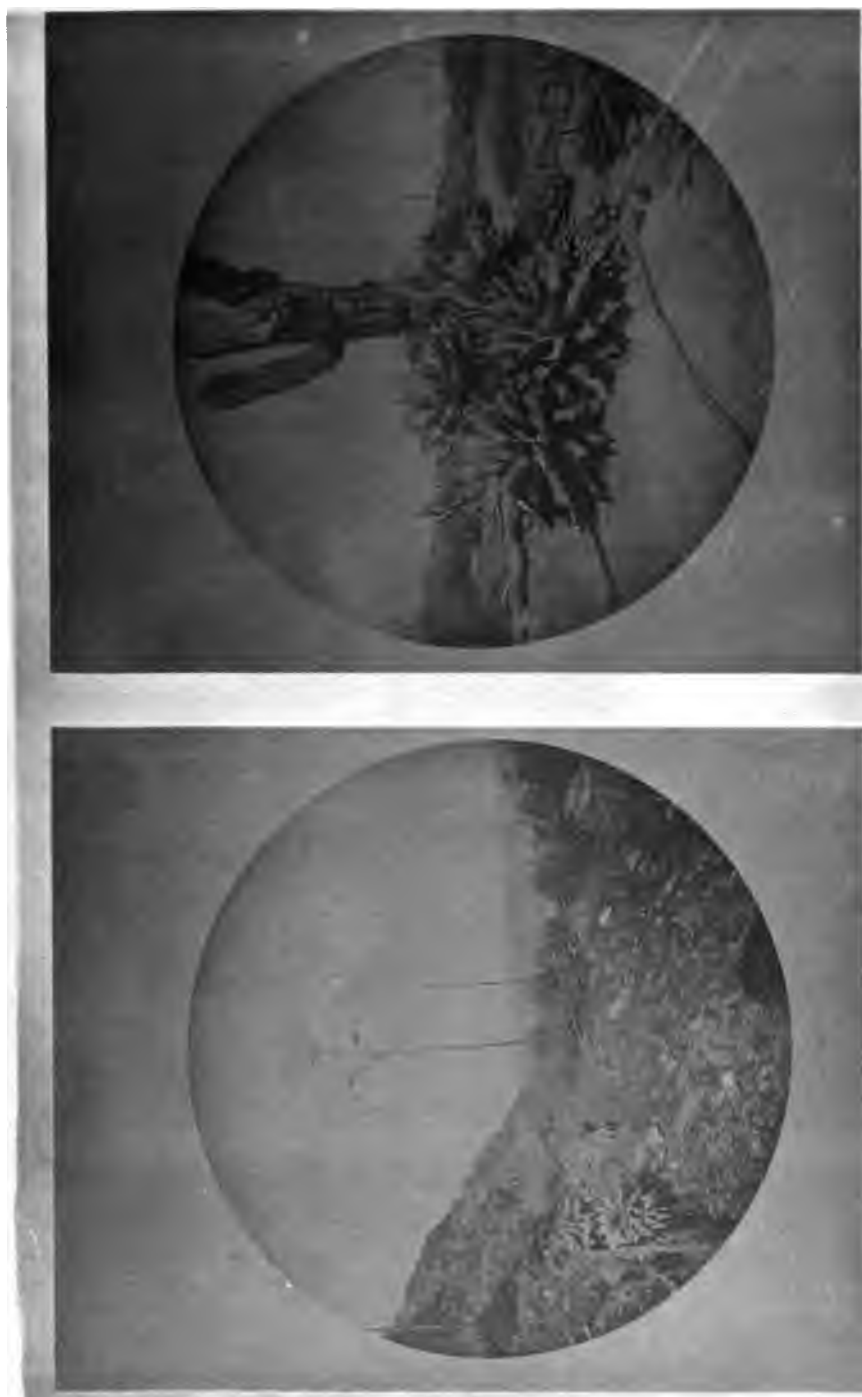


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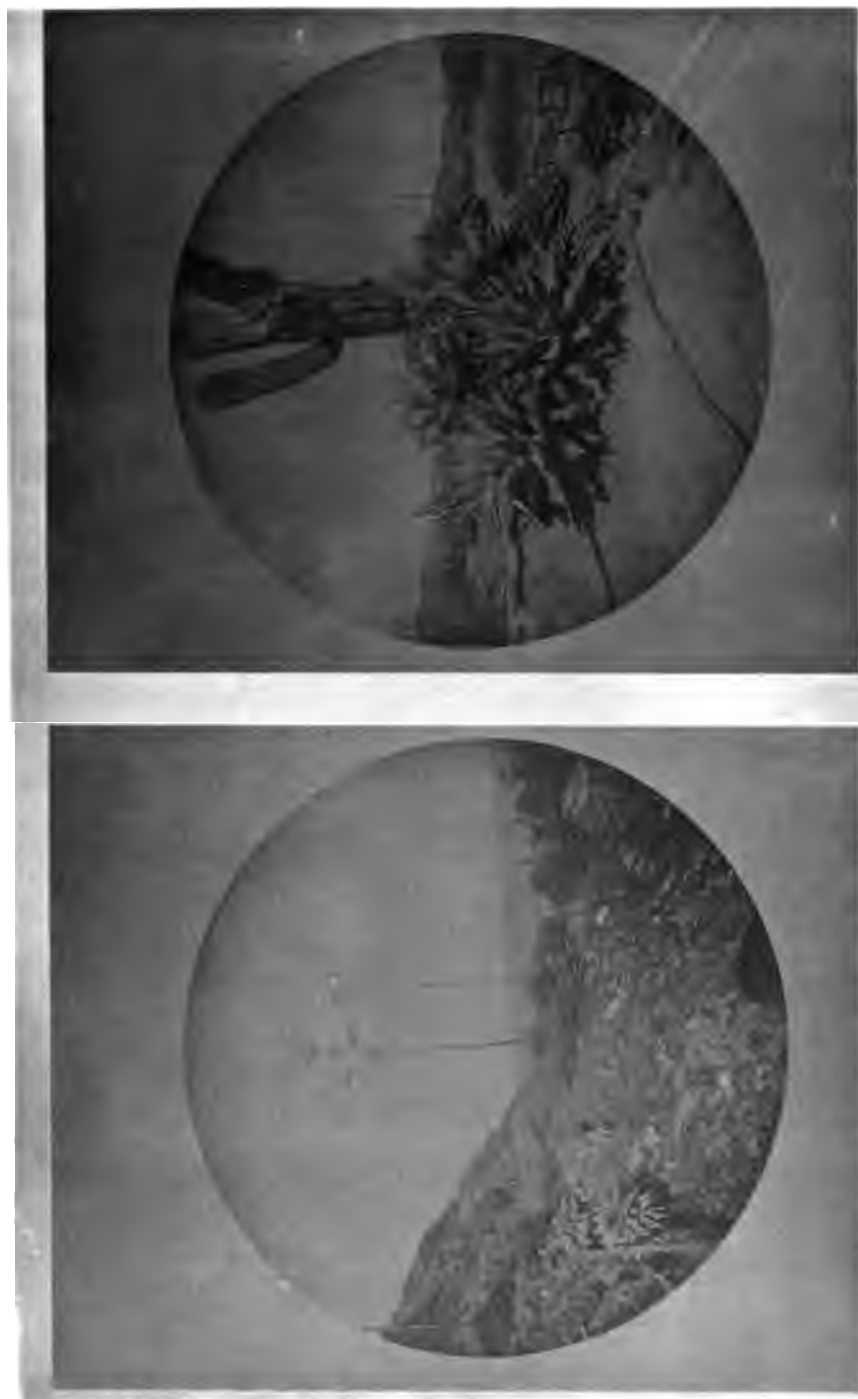


C. E. Benson del.

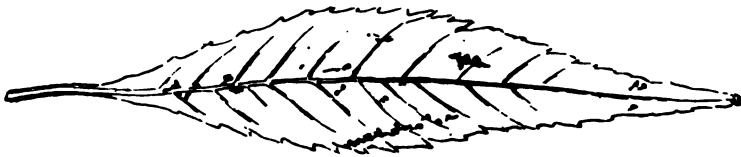
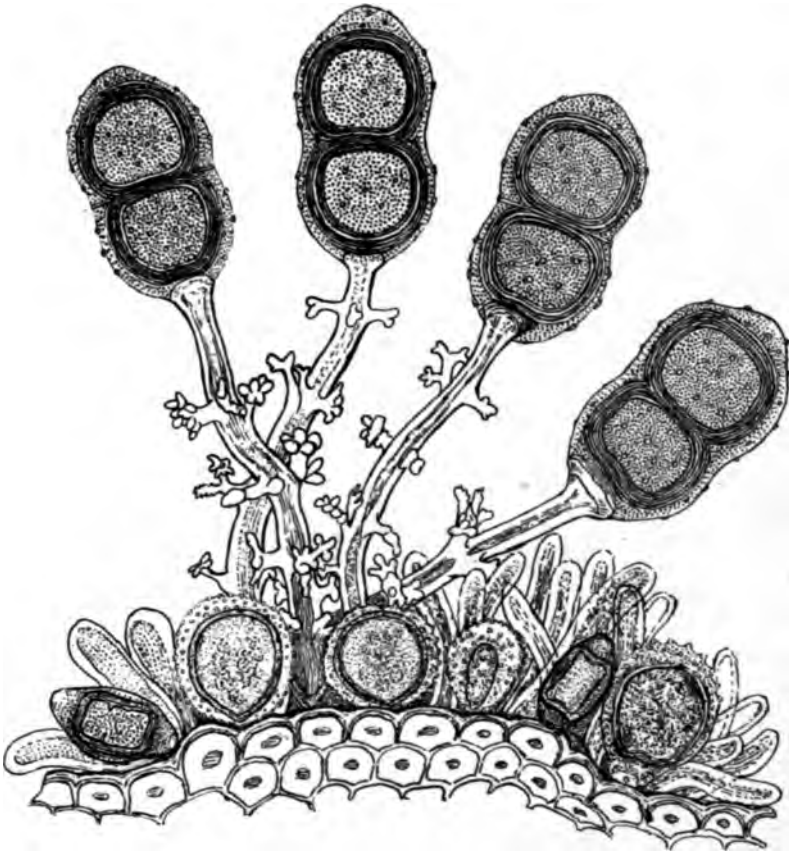
GILIA GLORIOSA.



AGAVE MARGARITÆ.



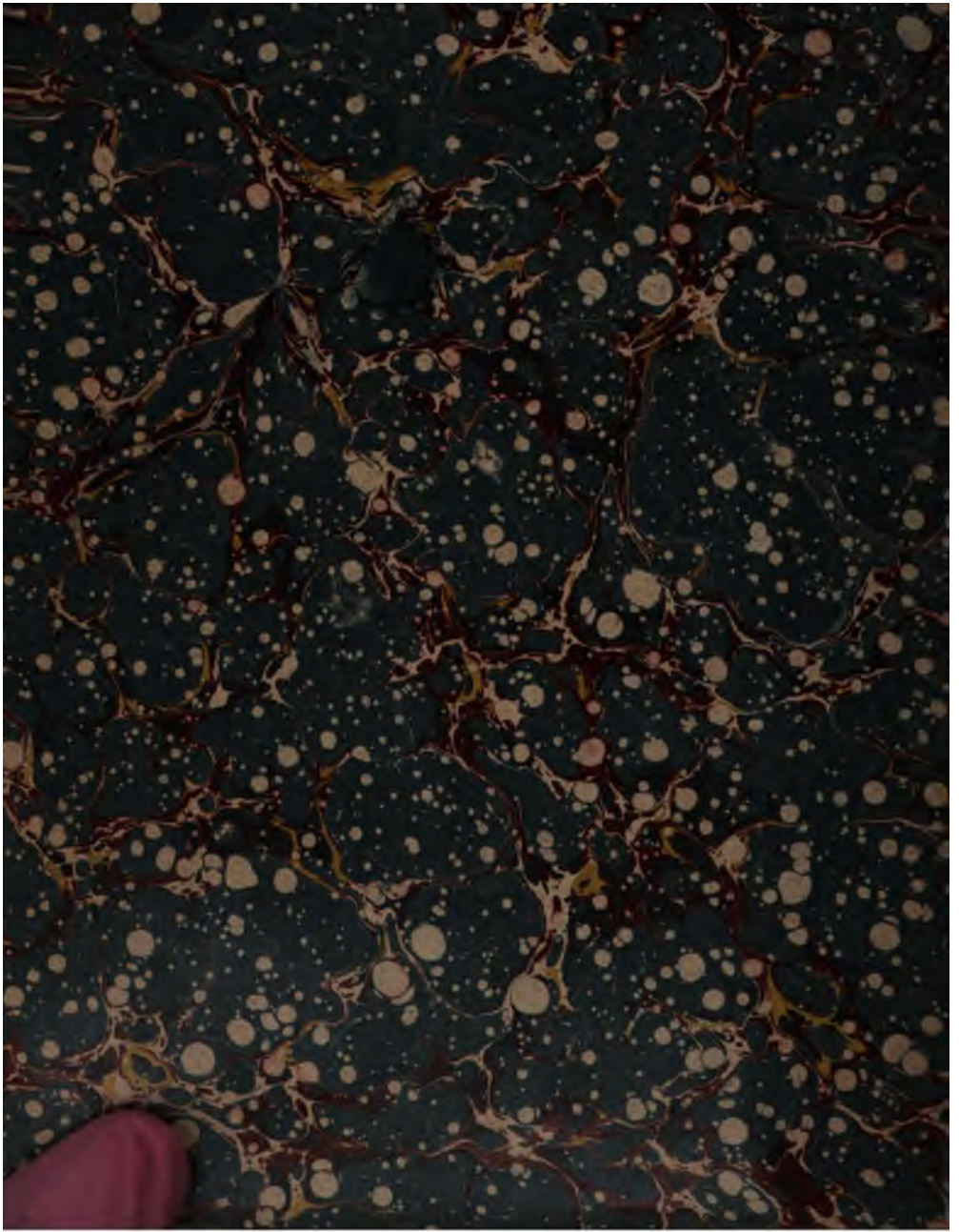
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F.V.Hopkins del.

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